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3924 MEADE ST.
DENVER, COLORADO

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SUPPLEMENTAL DATA TO PHOTOFACT FOLDER 2 INSET 208

Arvin Models 6173TM-UHF (Ch. TE332, -1), 6213TB-UHF, 6213TM-UHF, 6215CB-UHF and 6215CM-UHF (Ch. TE330) are covered in Photofact Folder 2 — Set 208.

Several new models have been added to this list. A chart showing all the models, with the Chassis used in each, is given below.

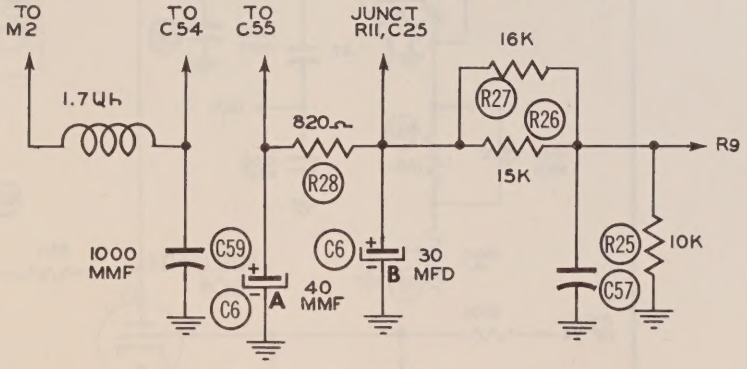
In later production numerous changes were made. Production changes in Arvin television receivers are coded by advancing the number following the dash in the chassis No. For example initial production in Ch. TE330 was stamped Ch. TE330. When the first change was made this was changed to TE330-1, with the second TE330-2, etc. A list of these changes are given below.

MODEL NO.	CHASSIS USED
6173TM-UHF	TE332, -1, -2, -3, -4
6213TB-UHF	TE330, -1, -2, -3, -4, -5, -6
6213TM-UHF	TE330, -1, -2, -3, -4, -5, -6
6215CB-UHF	TE330, -1, -2, -3, -4, -5, -6
6215CM-UHF	TE330, -1, -2, -3, -4, -5, -6
8171TM-UHF	TE332-5
8179TM-UHF	TE332-4
8211TB-UHF	TE330-7
8211TM-UHF	TE330-7
8213TM-UHF	TE330-6
8213TMA-UHF	TE330-61
8215CB-UHF	TE330-6
8215CBA-UHF	TE330-61
8215CM-UHF	TE330-6
8215CMA-UHF	TE330-61
8218CB-UHF	TE330-7
8218CM-UHF	TE330-7

Ch. TE330-1

Chassis TE330-1 is identical to Chassis TE330 except for the following:

A 1.7 microhenry Choke was added in series with the B+ lead to the tuner from the selenium rectifier (M2), the 1000MMF Capacitor, C59, is moved to the junction of the Coil and the switch. A partial schematic of this circuit is given below. These changes were made to eliminate regeneration and tweets.



ARVIN MODELS 6173TM-UHF(Ch. TE332, -1, -2, -3, -4), 6213TB-UHF, 6213TM-UHF, 6215CB-UHF, 6215CM-UHF(Ch. TE330, -1, -2, -3, -4, -5, -6), 8171TM-UHF (Ch. TE332-5), 8179TM-UHF(Ch. TE332-4), 8211TB-UHF, 8211TM-UHF(Ch. TE330-7), 8213TM-UHF(Ch. TE330-6), 8213TMA-UHF(Ch. TE330-61), 8215CB-UHF (Ch. TE330-6), 8215CBA-UHF(Ch. TE330-61), 8215CM-UHF(Ch. TE330-1), 8215CMA-UHF(Ch. TE330-61), 8218CB-UHF, 8218CM-UHF(Ch. TE330-7)

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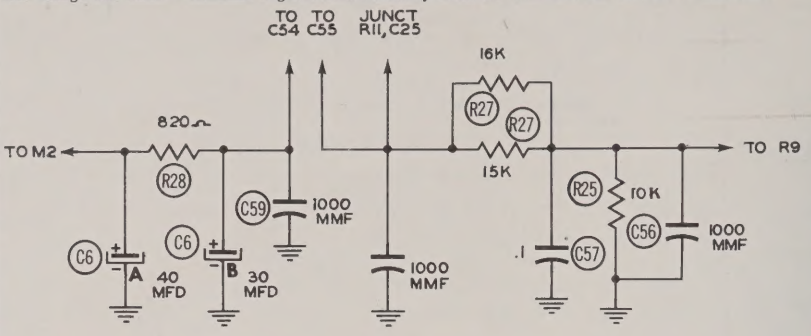
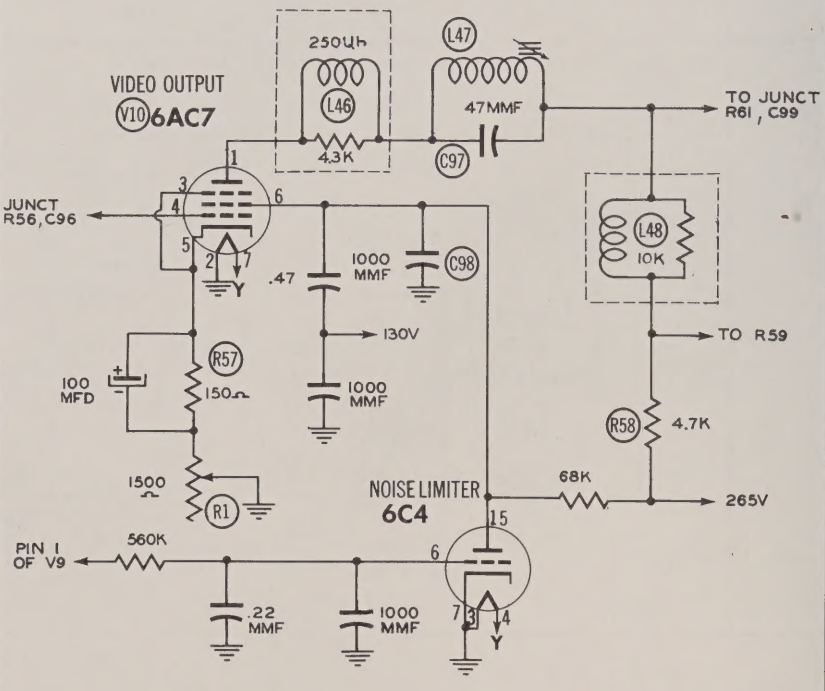
Ch. TE330-2	Chassis TE330-2 is identical to Chassis TE330-1 except for the following: The B+ filter circuit for the selenium rectifiers was changed to before the switch in Chassis TE330-2. This is the same as shown in Photofact Folder 2 – Set 108. A partial schematic of this circuit is given below. This change was made to eliminate regeneration caused by feedback from the video detector to the tuner.  In addition to the above, C47 was changed from 100MMF to 150MMF. This change was made to decrease the bandwidth of the converter output.
Ch. TE330-3	Chassis TE330-3 is identical to Chassis TE330-2 except for the following: The IF-FM trap was deleted. This change was made to reduce snow.
Ch. TE330-4, TE332-2	Chassis TE330-4 and TE332-2 are identical to Chassis TE330-3 and TE332-1 respectively except for the following: L46, video peaking coil, was changed to a 250microhenry coil, wound on a 4.3KΩ resistor (Part No. D25468-17). L12, video peaking coil, was changed to a 500 microhenry coil, wound on a 10KΩ resistor (Part No. D25468-16). These changes were made to reduce smearing and ringing. A 6C4 noise limiter stage was added to the chassis. A partial schematic of this circuit is given below. In addition to the changes shown R83, Sync Amplifier Grid load was changed from 2.2meg to 4.7 meg. This change was made to improve vertical noise imunity.  In addition to the above the picture tube in Ch. TE330-4 was changed from a 21MP4 to a 21AP4. When the 21AP4 tube is used the ion trap was changed to part No. C25662-3, the centering magnet (M2) was deleted and a PM Focus Magnet (Part No. C23910-2) was added.

Ch. TE330-5, TE332-3	Chassis TE330-5 and TE332-3 are identical to Chassis TE330-4 and TE332-2 respectively except for the following: The B+ for the screen (Pin 8) of the mixer (V4) which was taken from the junction of R34, R32 and C67 was changed. A 10KΩ, 2 W, 10% resistor was added from the 265V source to the junction of R18, C49 and R22 to supply this voltage. A 4700MMF bypass Capacitor was added from the tuner side of this resistor to ground. The Band Elimination Filter (M8) on the VHF antenna terminals has been replaced by a 127MC trap (Part No. C40916). This change was made to improve sensitivity. R83, sync amp grid load resistor, which was changed to 4.7 meg in Ch. TE330-4 and TE332-3 above, was changed back to 2.2 meg. In addition, in some chassis, C2C is replaced by a .22MFD Capacitor.
Ch. TE330-6, TE332-4	Chassis TE330-6 and TE332-4 are identical to Chassis TE330-5 and TE332-3 respectively except for the following: The UHF tuner was revised to improve the noise figure. The part number for the new VHF-UHF tuner assembly is AE25267-9. A schematic of this tuner is given on the next page. In addition the picture tube for Ch. TE332-4 was changed from a 17LP4 to a 17QP4. When the 17QP4 picture tube is used the ion trap was changed to part number C25662-3, the centering magnet (M12) was deleted and a PM Focus magnet (Part No. C40991-1) was added. Ch. TE332-4 also contains the resistor addition outlined for Ch. TE330-7 below.
Ch. TE330-7, TE332-4	Chassis TE330-7 is identical to Chassis TE330-6 except for the following: A 68KΩ resistor was added across the UHF B+ switch (junction C58, R26, R27 to junction C6B, C59 and R28) to provide standby current in the UHF tubes during VHF operation. The picture tube for Ch. TE330-7 was also changed from a 21AP4 to a 21ZP4 and mechanical change was made in the control mountings.
Ch. TE332-5	Chassis TE332-5 is identical to Chassis TE332-4 except for a mechanical change in the control mounting.
Ch. TE330-61	Chassis TE330-61 is identical to Chassis TE330-6 except a 21ZP4 picture tube is used in place of the 21AP4 tube.

ARVIN MODELS 6173TM-UHF(Ch. TE332-1, -2, -3, -4), 6213TB-UHF, 6213TM-UHF, 6215CB-UHF, 6215CM-UHF(Ch. TE330-1, -2, -3, -4, -5, -6), 6171TM-UHF(Ch. TE332-1, -2, -3, -4), 6217TM-UHF(Ch. TE332-1, -2, -3, -4), 6217TB-UHF, 6217TM-UHF, 8213TB-UHF(Ch. TE330-6), 8213TMA-UHF(Ch. TE330-6), 8215CB-UHF(Ch. TE330-6), 8215CM-UHF(Ch. TE330-6), 8215CMA-UHF(Ch. TE330-6), 8218CB-UHF, 8218CM-UHF(Ch. TE330-6), 8218CMA-UHF(Ch. TE330-6), 8218TM-UHF(Ch. TE330-6), 8218TMA-UHF(Ch. TE330-6), 8218CB-UHF, 8218CM-UHF(Ch. TE330-7).

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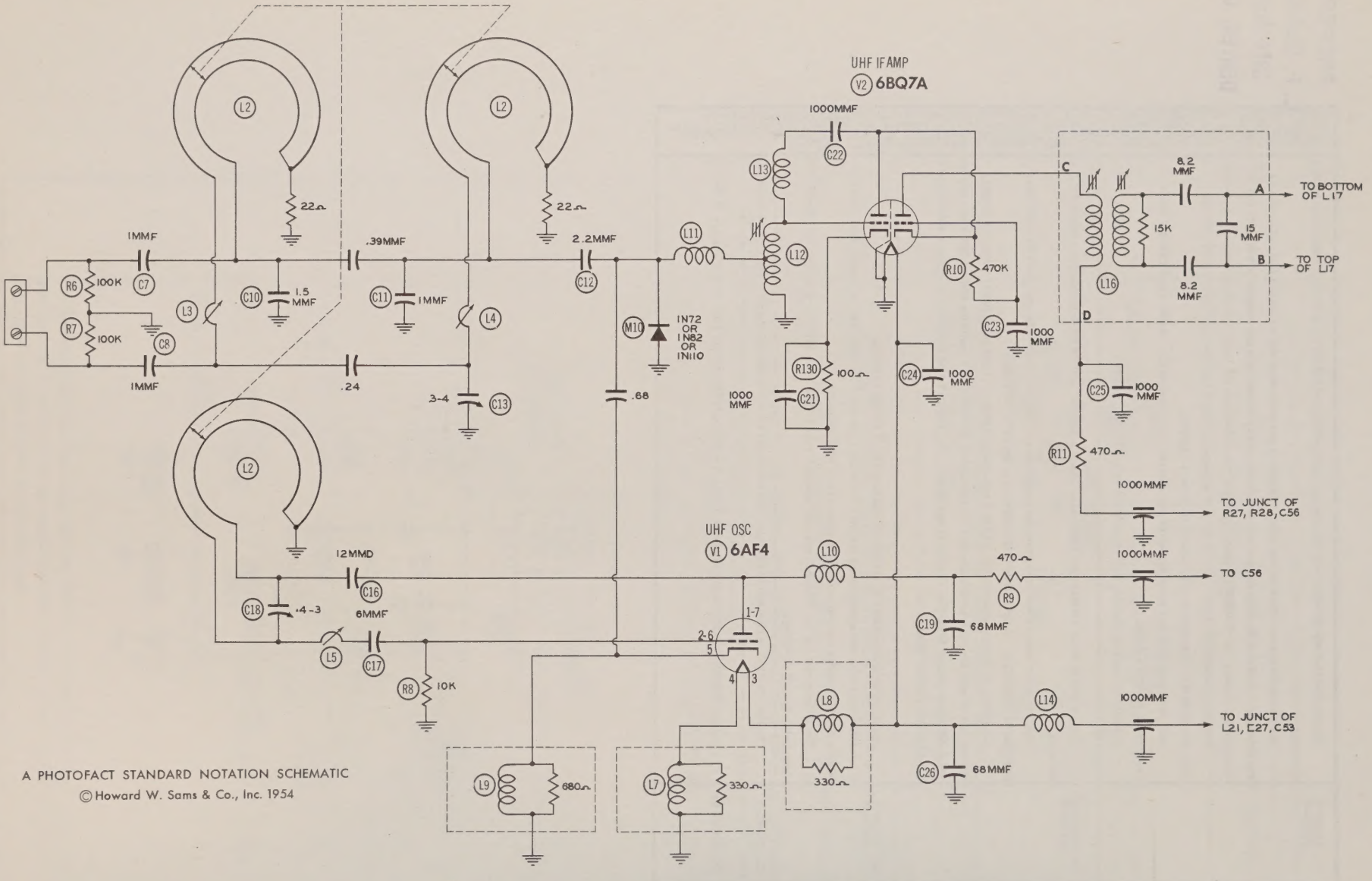

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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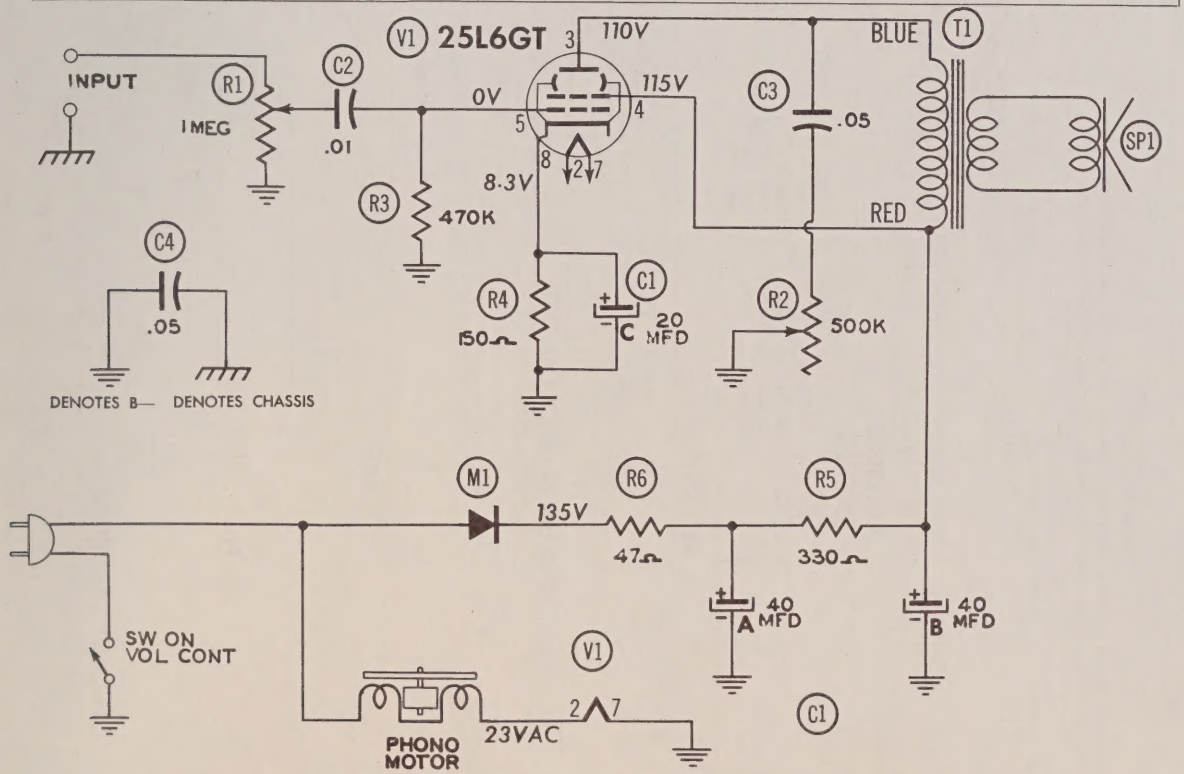
AIRCASTLE
MODEL 652.3S1

AIRCASTLE
MODEL 652.3S1

TRADE NAME	Aircastle Model 652.3S1
SUPPLIER	Spiegel, Inc., 1061 W. 35th. St., Chicago 9, Ill.
TYPE SET	AC Operated Phono Amplifier With 3 Speed Manual Record Player
TUBES (One)	Type 25L6GT Audio Amplifier
POWER SUPPLY	110-120 Volts AC-60 Cycles RATING .36 Amp. @ 117 Volts AC



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PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA: AIRCASTLE PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RETMA BASE TYPE	NOTES
V1	Audio Output	25L6GT	25L6GT	7S	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: AIRCASTLE PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C1A	40	150	EC442	PRS150/50-30-20		EDL44215		3N532	TVA-3448	
B	40	150								
C	20	150								
C2	.01	600		PR688-01	D6-103	PTE6S1	GP2-333-103	PT611	6TM-S1	
C3	.05	400		PR488-05	DF-503	PTE4S5		PT415	4TM-S5	Note 1
C4	.05	400		PR488-05	DF-503	PTE4S5		PT415	4TM-S5	

Note 1. Not used in all Models.

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: AIRCASTLE PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	1Meg	½	VC-42	Q13-137	AG-63-Z	BSK-70-S	U-53	Volume
B	Shaft		Not Req.	Not Req.	KSS-3	Not Req.	Not Req.	Attach to R1A
C	Switch		Not Req.	76-1	SWB	Not Req.	US-26	Attach to R1A
R2	500KΩ	½						Tone - Note

Note: Not used in all Models.

RESISTORS

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: AIRCASTLE PART No.	REPLACEMENT DATA: IRC PART No.	NOTES
R3	470KΩ	½		BTS-470K	
R4	150Ω	1		BTA-150	

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: STEELMAN PART No.	REPLACEMENT DATA: IRC PART No.	NOTES
R5	330Ω	1		BTA-330	
R6	47Ω	1			

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	RATING: IMPEDANCE PRI.	RATING: IMPEDANCE SEC.	RATING: DC RES. PRI.	RATING: DC RES. SEC.	REPLACEMENT DATA: AIRCASTLE PART No.	STANCOR PART No.	MERIT PART No.	Halldorson PART No.	TRIAD PART No.	NOTES
T1	2.5KΩ	3.2Ω	148Ω	.34Ω		A-3332 ①	A-3025 ①	Z1005 ①	S-1X ①	① Bend mounting tabs down, file out slots, mount on original mounting bracket.

SPEAKER

ITEM No.	RATINGS: SIZE	RATINGS: FIELD	RATINGS: V. C. IMP.	REPLACEMENT DATA: AIRCASTLE PART No.	JENSEN PART No.	QUAM PART No.	NOTES
SP1	4"	PM	3.2Ω		ST-113 Mod. P4-X	4A1	

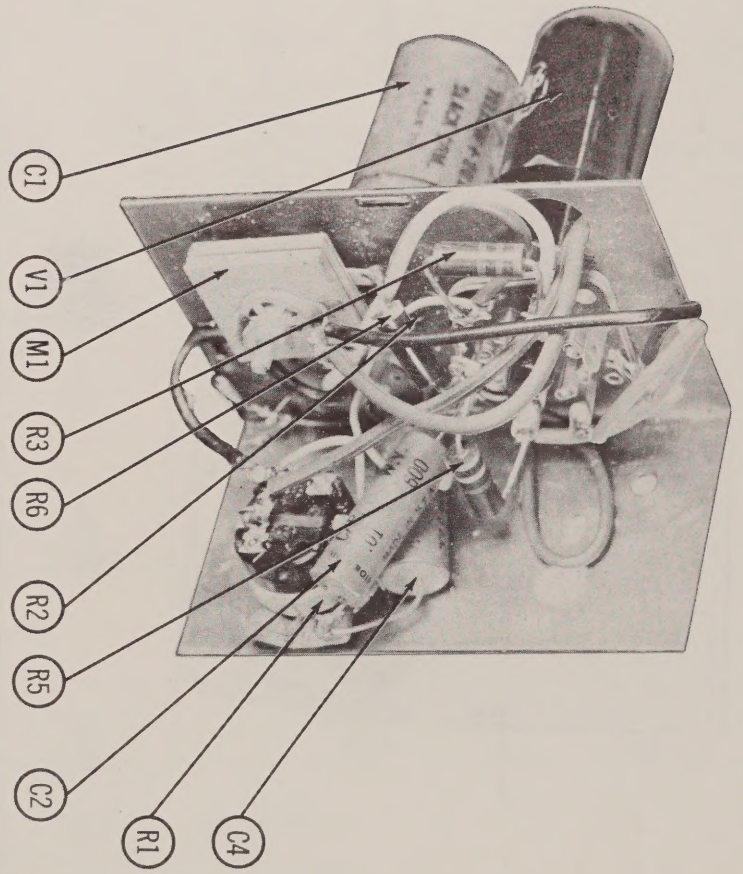
SELENIUM RECTIFIER

ITEM No.	RATING: CURRENT	REPLACEMENT DATA: AIRCASTLE PART No.	SELETRON PART No.	FEDERAL PART No.	MALLORY PART No.	SARKES TARZIAN PART No.	NOTES
M1	.050ADC		8J1	1002A	6S65	65	

PHONO CARTRIDGE

ITEM No.	REPLACEMENT DATA: AIRCASTLE PART No.	ASTATIC PART No. CARTRIDGE	ASTATIC PART No. NEEDLE	SHURE PART No. CARTRIDGE	SHURE PART No. NEEDLE	ELECTRO-VOICE PART No. CARTRIDGE	ELECTRO-VOICE PART No. NEEDLE	REMARKS
M2		*PL-29				*25H60		* Complete arm and cartridge assembly.

CHASSIS—BOTTOM VIEW



PHONO NEEDLE

(FOR REPLACEMENT IN ORIGINAL EQUIPMENT CARTRIDGE)

ITEM No.	REPLACEMENT DATA: AIRCASTLE PART No.	WALCO PART No.	JENSEN PART No.	REMARKS
M3		W-14AGA	W-422	

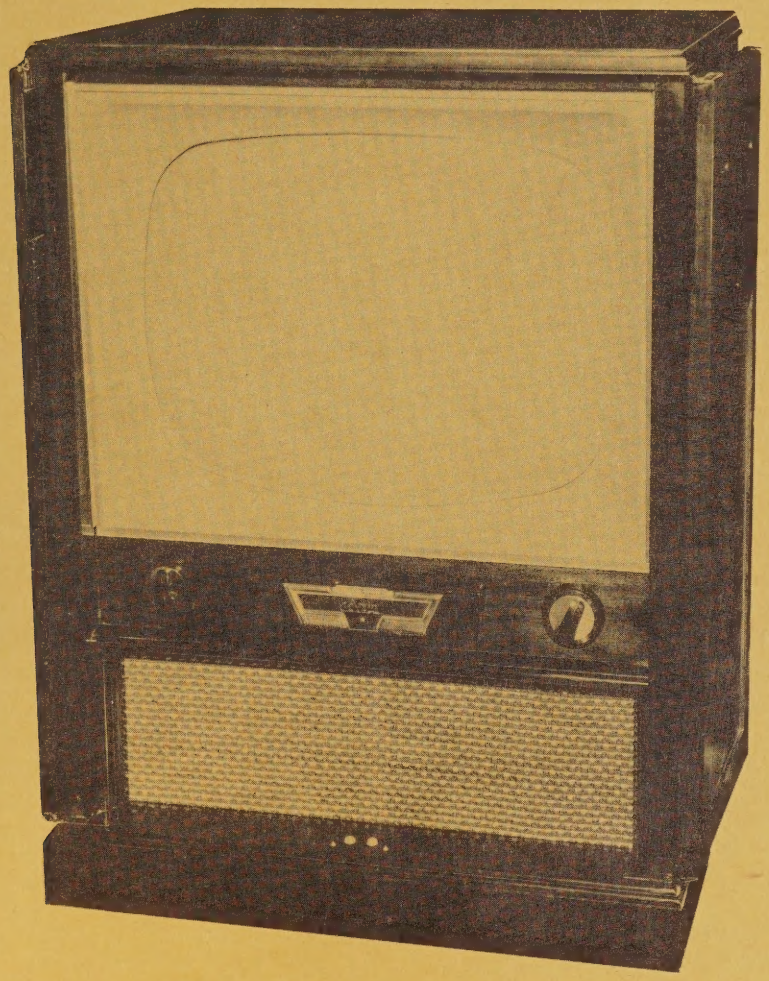
SET 231

FOLDER 2

IMPORTANT FILING NOTICE

The contents for this envelope will be found among the last folders in this complete set of folders . . . *unless* it has been purchased as part of a *complete* volume of PHOTOFACTS assembled in a DeLuxe Binder.

Merely insert the corresponding folder on this model in this envelope to retain proper filing and indexing order.



MODEL 7279CM-UHF

ARVIN MODELS 7276CB-UHF,
7279CM-UHF (Ch. TE-340, -1, -2)

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ARVIN MODELS 7276CB-UHF, 7279CM-UHF (Ch. TE-340, -1, -2)

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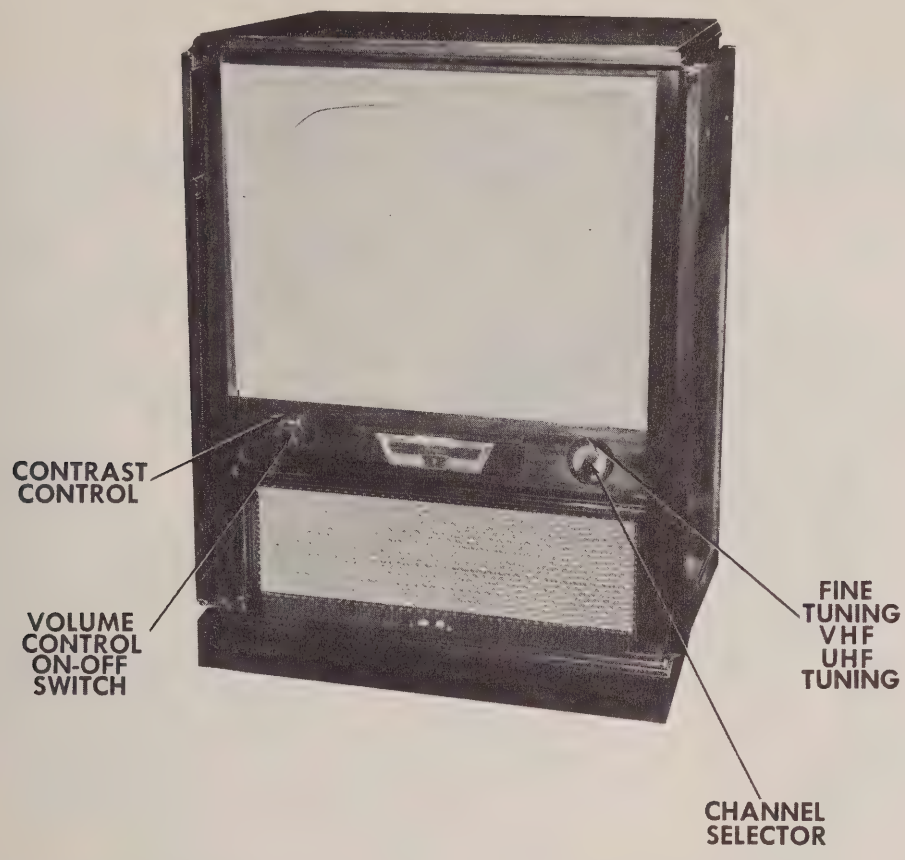

ARVIN MODEL 7279CM-UHF (Ch. TE340-1)

TRADE NAME	Arvin Models 7276CB-UHF, 7279CM-UHF (Ch. TE340, -1, -2)
MANUFACTURER	Arvin Industries, Columbus, Indiana
TYPE SET	Television Receiver
TUBES	Twenty-eight
POWER SUPPLY	110-120 Volts AC-60 cycle RATING 2.88 Amp. @ 117 Volts AC
TUNING RANGE—	Channels 2 thru 13 VHF, 14 thru 83 UHF, Video IF 45.75MC, Sound IF 41.25MC (Intercarrier)

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DATE 2-54 SET 231 FOLDER 3

ARVIN MODELS 7276CB-UHF, 7279CM-UHF (Ch. TE-340, -1, -2)

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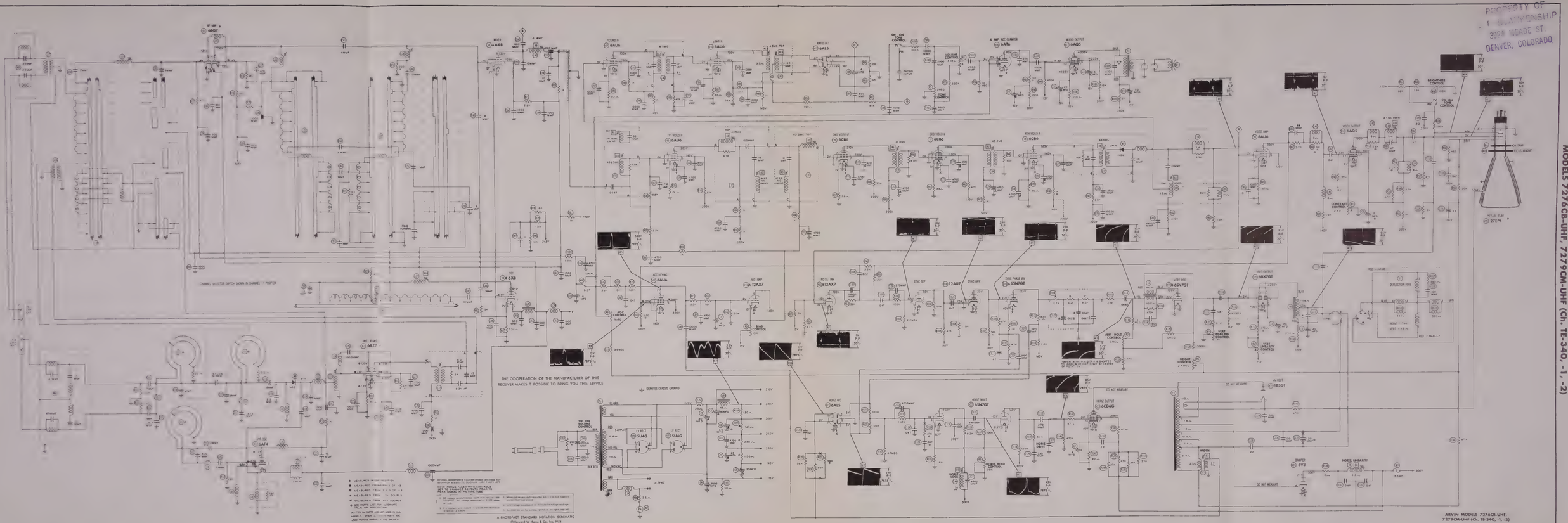
ARVIN
MODELS 7276CB-UHF, 7279CM-UHF (Ch. TE-340, -1, -2)
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ARVIN MODELS 7276CB-UHF, 7279CM-UHF (Ch. TE-340, -1, -2)

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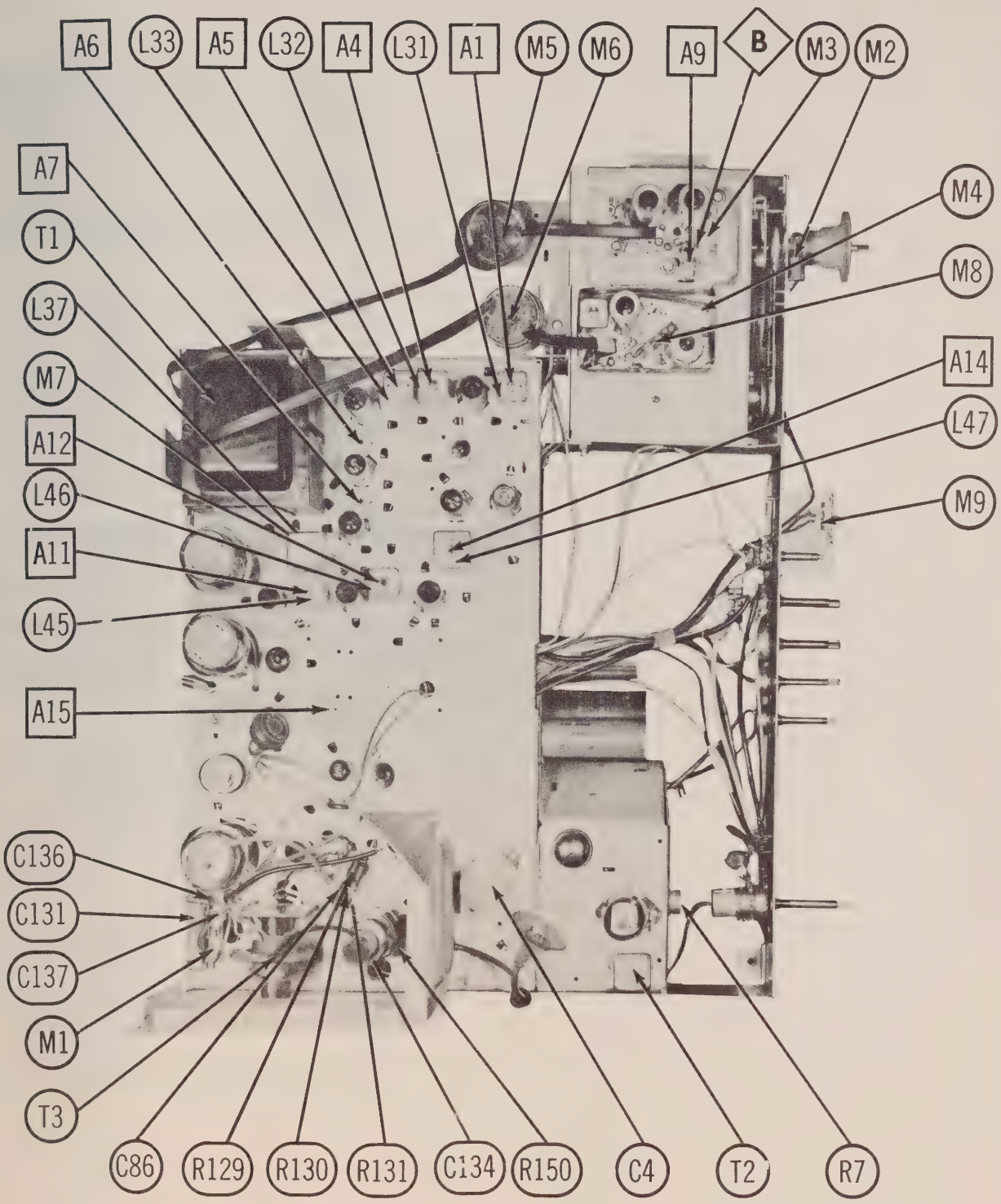

For tube location see tube placement chart page 5

CHASSIS TOP VIEW

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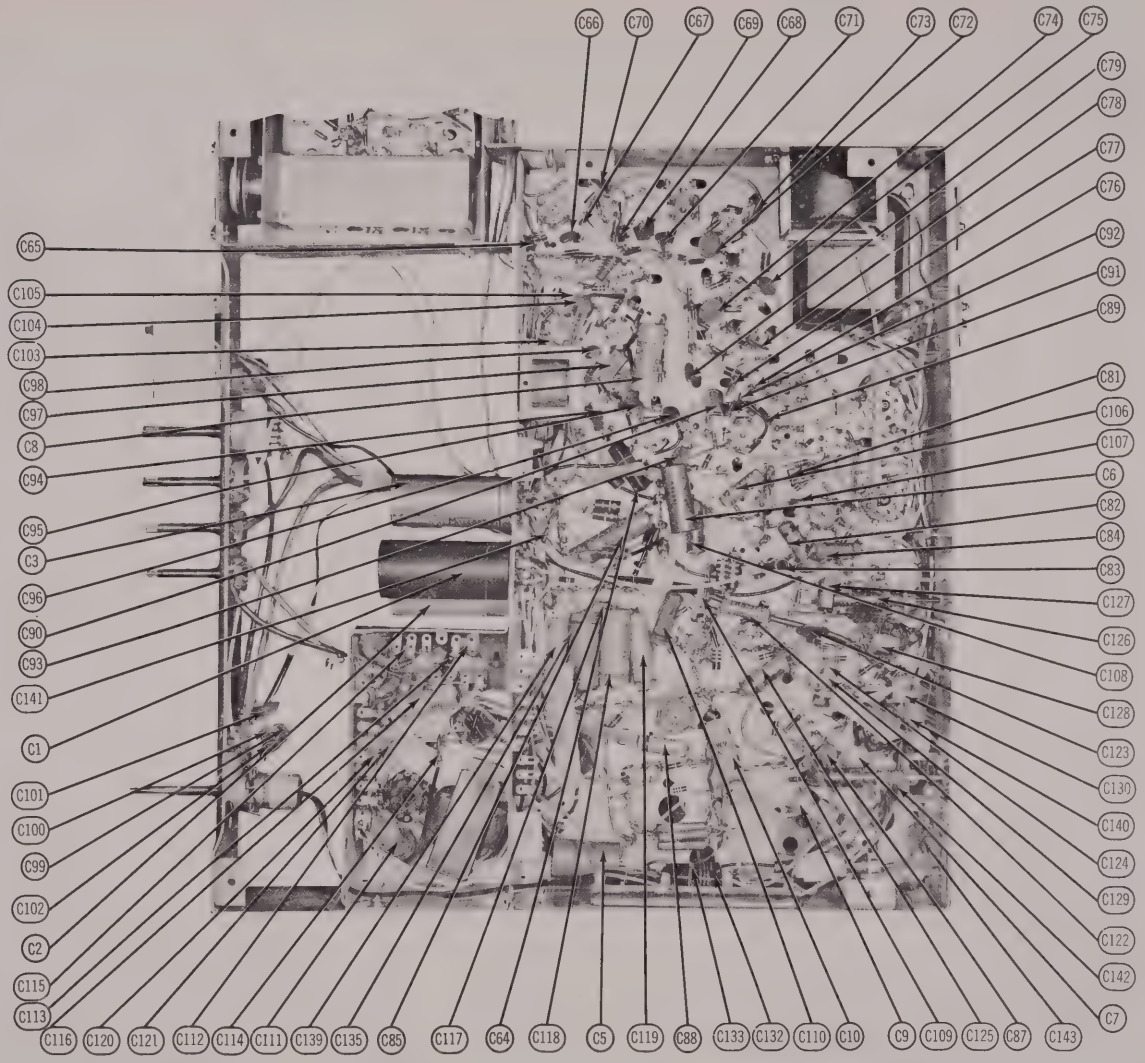
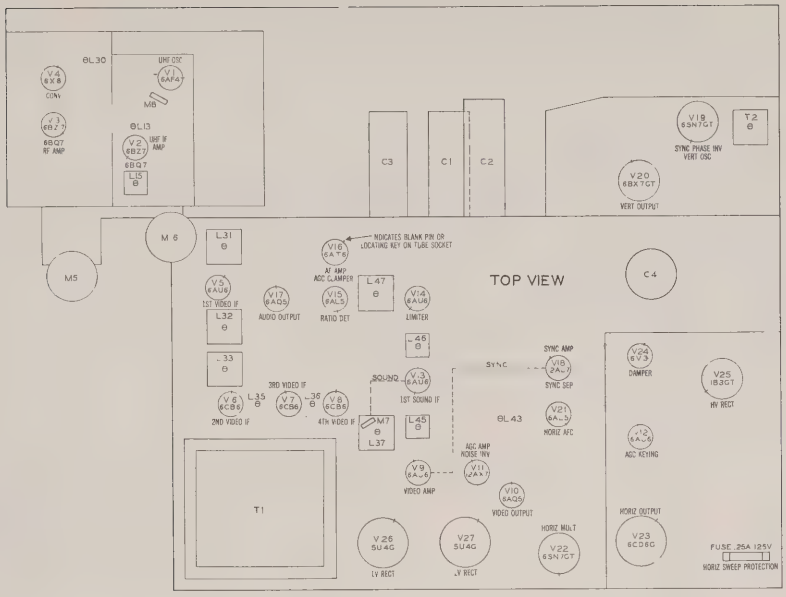


CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION

TUBE PLACEMENT CHART



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TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce the indicated symptoms. Refer to tube placement chart for location and type of tube.

POWER SUPPLY FAILURE
No raster, no sound - V26, V28

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster - V4, V5, V6, V7, V8 (V1, V2 UHF only)
No pic, no sound, has snow - V3, V4, V5
No pic, has sound, has raster - V9, V10, V28
Has pic, no sound - V13, V14, V15, V16, V17
Overloaded picture - V11, V12, V16

SYNC FAILURE
No vert. sync - V19
No horiz. sync - V19, V21, V22
No vert. or horiz. sync - V18, V19

SWEEP FAILURE
No raster, has sound - V22, V23, V24, V25, V28, Fuse (M1)
No vertical deflection - V19, V20
Poor vert. linearity or foldover - V19, V20
Poor horiz. linearity or foldover - V22, V23, V24
Narrow picture - V22, V23, V24, V25, V26, V27
Vert. off freq. - V19, V20
Horiz. off freq. - V19, V21, V22

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

The high voltage shock hazard may be eliminated by removing the horizontal oscillator tube (V22) from its socket.

AGC ADJUSTMENTS

1. Connect pin 1 (grid) of 6CB6 (V7) to ground.
2. Connect the DC Probe of a VTVM to pin 8 (cathode) of 12AX7 (V11B). Connect common to chassis. Adjust bias control for zero volts on VTVM.
3. Set local distance switch on "distance.
   Remove AGC Keyer (V12) from its socket.
   Connect the negative lead of a 0TO-30 Volt variable bias supply (Fig. 1) to pin 5 (Plate) of V12.
4. Connect the DC Probe of the VTVM to the ungrounded side of C10 (Tuner AGC). Commen to chassis. Adjust the AGC control (R8A) for - 1.75 Volts on VTVM.
   Switch to local position. The VTVM should read approximately - 4 Volts. Remove short from pin 1 of V7.

VIDEO IF ALIGNMENT

Set "local-distance" switch to "local".
Remove AGC Keyer (V12) from its socket.
Connect the DC Probe of the VTVM to pin 8 of V11B.
Common to chassis. Connect the bias supply as in Fig. 1 and adjust for zero volts on VTVM.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
1.	Direct	High side to tuner test point (B). Low side to chassis.	39.75MC (Unmod)	Any non-interfering channel	DC probe thru isolation net (Fig.2) to point (A). Common to chassis.	A1	Adjust for MINIMUM deflection.
2.	"	"	41.25MC	"	"	A2	"
3.	"	"	47.25MC	"	"	A3	"
4.	"	"	43.5MC	"	"	A4	Adjust for maximum deflection.
5.	"	"	42.0MC	"	"	A5	Adjust for maximum deflection Check steps 3 and 4.
6.	"	"	41.8MC	"	"	A6	Adjust for maximum deflection.
7.	"	"	45.3MC	"	"	A7	"
8.	"	"	43.5MC	"	"	A8	"
9.	10KΩ Carbon Resistor	High side thru 10KΩ to tuner test point (B). Low side to chassis.	41.8MC	"	"	A9	"
10.	"	"	45.25MC	"	"	A10	"

OVERALL VIDEO IF RESPONSE CHECK

Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
Leave bias supply and VTVM connected as under video IF alignment. Adjust for - 6 Volts at VTVM.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
11.	.01MFD	High side to pin 1 (grid) of 6AU6 (V5). Low side to chassis.	44.0MC (10MC Swp)	41.25MC 42.25MC 45.75MC 47.25MC	Any non-interfering channel	Vert. Amp. thru detector (Fig.3) to lug "A" of L35, and junction of R38 and R39. Low side to chassis.		SLIGHTLY retouch A2, A3, A4 and A5 for response similar to Fig. 4.
12.	Two 120Ω carbon resistors	Across antenna terminals with 120Ω in each lead.	195MC (10MC Swp)	193.25MC Couple 2nd. marker gen. loosely to IF strip for 29.75MC 41.9MC 45.0MC	10	Vert. Amp. thru detector (Fig.3) to lug "B" of L32 and junction of R34 and C68.		SLIGHTLY retouch A1, A9 and A10 for response similar to Fig. 5.
13.	"	"	"	193.25MC 197.75MC Couple 2nd. marker gen. loosely to IF strip for 42.25MC 45.0MC	"	Vert. Amp. thru 27KΩ to point (A). Low side to chassis.		SLIGHTLY retouch A6, A7 and A9 for overall response similar to Fig. 6.

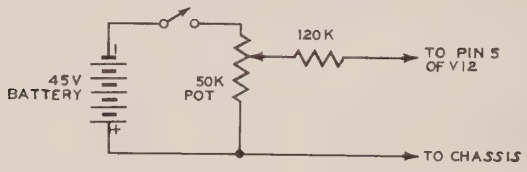

FIG.1

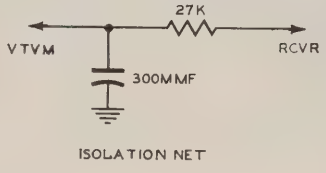

FIG.2

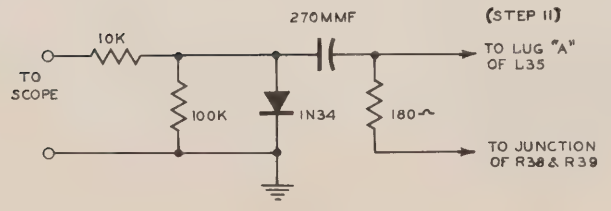

FIG.3

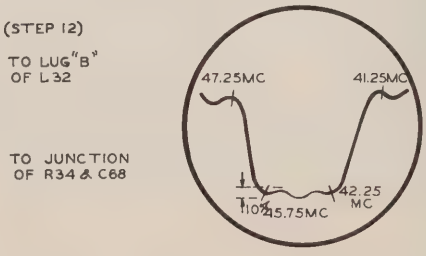

FIG.4

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DENVER, COLORADO

ALIGNMENT INSTRUCTIONS (cont)

SOUND IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
14.	.01MFD	High side to point (A). Low side to chassis.	4.5MC (Unmod.)	Any non-interfering channel	DC probe to point (C). Common to chassis.	All, A12, A13	Adjust for maximum deflection.
15.	"	"	"	"	DC probe to point (D). Common to chassis.	A14	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.

SOUND IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60~ modulation and 450KC sweep. Use 120~ sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
14.	.01MFD	High side to point (A). Low side to chassis.	4.5MC (450KC Swp)	4.5MC	Any non-interfering channel	Vert. Amp. to point (C). Low side to chassis.	All, A12, A13	Disconnect stabilizer capacitor C8. Adjust for curve of maximum amplitude and symmetry as in Fig. 7.
15.	"	"	"	"	"	Vert. Amp. to point (D). Low side to chassis.	A14	Reconnect stabilizer capacitor C8. Adjust so that 4.5MC occurs at center of cross-over lines as in Fig. 8. SLIGHTLY retouch A13 for maximum amplitude and straightness of crossover lines.

4.5MC TRAP ALIGNMENT

Connect jumper from junction of R57 & C84 to pin 1 (grid) of 6AU6 (V14).

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
16.	100MMF	High side thru 100MMF to pin 1 (grid) of 6AQ5 (V10). Low side to chassis.	4.5MC (Unmod)	Any non-interfering channel	DC probe to point (C). Common to chassis.	A15	Adjust for MINIMUM deflection.

VHF OSCILLATOR ALIGNMENT

Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection. The sweep generator output lead should be terminated with its characteristic impedance, usually 50Ω. Set the fine tuning control to the mid-position of its range.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
17.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	213MC (10MC Swp)	215.75MC	13	Vert. Amp. to point (A). Low side to chassis.	A16	Adjust to place sound marker in trap notch on low frequency side of response curve as in Fig. 9.
18.	"	"	207MC (10MC Swp)	209.75MC	12	"		Check for sound marker placement as in Fig. 6. If necessary, make compromise adjustment of A16 for any individual channel, then check all other high band channels to see that they have not been seriously affected.
			201MC (10MC Swp)	203.75MC	11			
			195MC (10MC Swp)	197.75MC	10			
			189MC (10MC Swp)	191.75MC	9			
			183MC (10MC Swp)	185.75MC	8			
			177MC (10MC Swp)	179.75MC	7			
19.	"	"	85MC (10MC Swp)	87.75MC	6	"	A17	Adjust to place sound marker in trap notch on low frequency side of response curve as in Fig. 6.
20.	"	"	79MC (10MC Swp)	81.75MC	5	"		Check for sound marker placement as in Fig. 6. If necessary, make compromise adjustment of A17 for any individual channel, then check all other low band channels to see that they have not been seriously affected.
			69MC (10MC Swp)	71.75MC	4			
			63MC (10MC Swp)	65.75MC	3			
			57MC (10MC Swp)	59.75MC	2			

RF AND MIXER ALIGNMENT

The RF and mixer portions of the VHF tuner and all of the UHF tuners have been properly aligned at the factory and are very stable. Alignment of these portions should not be required in the field.

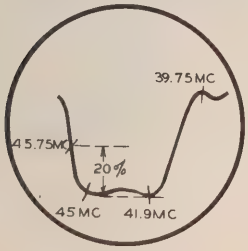


FIG. 5

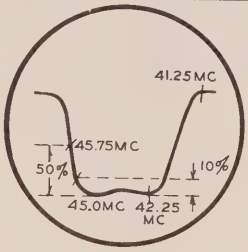


FIG. 6

FIG. 7

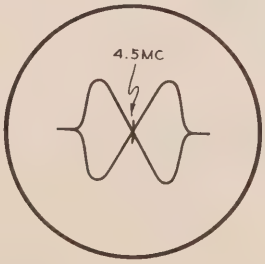


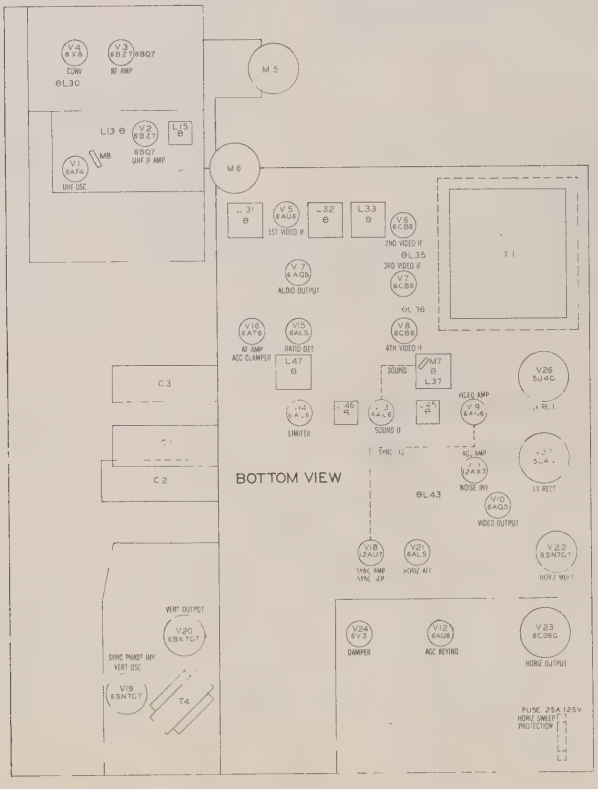
FIG. 8

FIG. 9

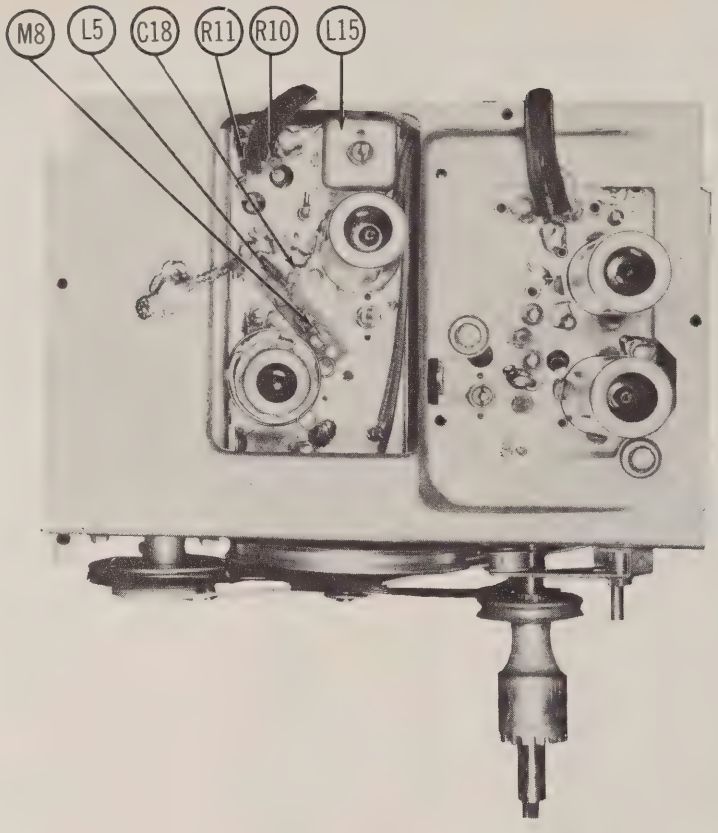
RESISTANCE MEASUREMENTS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6AF4	■† 10KΩ	10KΩ	.1Ω	0Ω	0Ω	10KΩ	■† 10KΩ		
V 2	6BZ7	■† 1. 6KΩ	INF	INF	0Ω	.1Ω	INF	0Ω	100Ω	0Ω
V 3	6BZ7	† 1. 6KΩ	† 500KΩ	INF	.1Ω	0Ω	INF	1 Meg	0Ω	0Ω
V 4	6X8	0Ω	15KΩ	† 7. 7KΩ	0Ω	.1Ω	220Ω	220KΩ	† 5. 2KΩ	† 4KΩ
V 5	6AU6	15KΩ	0Ω	0Ω	.1Ω	† 2. 8KΩ	† 34KΩ	100Ω		
V 6	6CB6	9KΩ	56Ω	0Ω	.1Ω	† 1. 8KΩ	† 34KΩ	0Ω		
V 7	6CB6	.3Ω	68Ω	.1Ω	0Ω	† 3KΩ	† 6. 7KΩ	0Ω		
V 8	6CB6	.3Ω	180Ω	.1Ω	0Ω	† 7. 6KΩ	† 1. 8KΩ	0Ω		
V 9	6AU6	3. 9KΩ	0Ω	0Ω	.1Ω	† 9KΩ	† 2KΩ	47Ω		
V 10	6AQ5	1Meg	800Ω	.1Ω	0Ω	† 5KΩ	† 1. 8KΩ	1 Meg		
V 11	12AX7	† 87KΩ	600Ω	3. 9KΩ	.1Ω	.1Ω	† 2KΩ	120KΩ	8KΩ	0Ω
V 12	6AU6	† 40KΩ	† 27KΩ	0Ω	.1Ω	250KΩ	† 225Ω	† 2KΩ		
V 13	6AU6	470KΩ	0Ω	0Ω	.1Ω	† 3KΩ	† 4KΩ	82Ω		
V 14	6AU6	47KΩ	0Ω	0Ω	.1Ω	† 3KΩ	† 27KΩ	68Ω		
V 15	6AL5	INF	INF	0Ω	.1Ω	10KΩ	0Ω	10KΩ		
V 16	6AT6	10Meg	0Ω	0Ω	.1Ω	410KΩ	410KΩ	† 250KΩ		
V 17	6AQ5	470KΩ	380Ω	0Ω	.1Ω	† 2. 5KΩ	† 15KΩ	470KΩ		
V 18	12AU7	† 22KΩ	2. 2Meg	0Ω	.1Ω	.1Ω	† 60KΩ	0Ω	270KΩ	0Ω
V 19	6SN7GT	2. 6Meg	▲ 2. 7Meg	0Ω	50KΩ	† 4. 6KΩ	5. 8KΩ	.1Ω	0Ω	
V 20	6BX7GT	2. 2Meg	† 1. 6KΩ	1. 3KΩ	2. 2Meg	† 1. 6KΩ	1. 3KΩ	.1Ω	0Ω	
V 21	6AL5	4. 8Meg	4. 8Meg	.1Ω	0Ω	28KΩ	0Ω	28KΩ		
V 22	6SN7GT	110KΩ	† 120KΩ	1. 2KΩ	5. 7Meg	† 8. 4KΩ	1. 2KΩ	0Ω	.1Ω	
V 23	6CD6G	INF	0Ω	300Ω	INF	470KΩ	† 8KΩ	.1Ω	† 8KΩ	TOP CAP ▲ 8Ω
V 24	6V3	INF	† 250Ω	INF	.1Ω	0Ω	INF	† 250Ω	INF	† 250Ω — TOP CAP 1 Meg
V 25	1B3GT	PINS 1-8 HAVE INV. RESISTANCE								TOP CAP ▲ 419Ω
V 26	5U4G	INF	16KΩ	INF	62Ω	50Ω	63Ω	† 25Ω	16KΩ	
V 27	5U4G	50Ω	16KΩ	†70Ω	62Ω	INF	63Ω	INF	16KΩ	
V 28	27EP4	0Ω	470KΩ	PIN 10 ▲ 200KΩ	PIN 11 130KΩ	PIN 12 .1Ω				

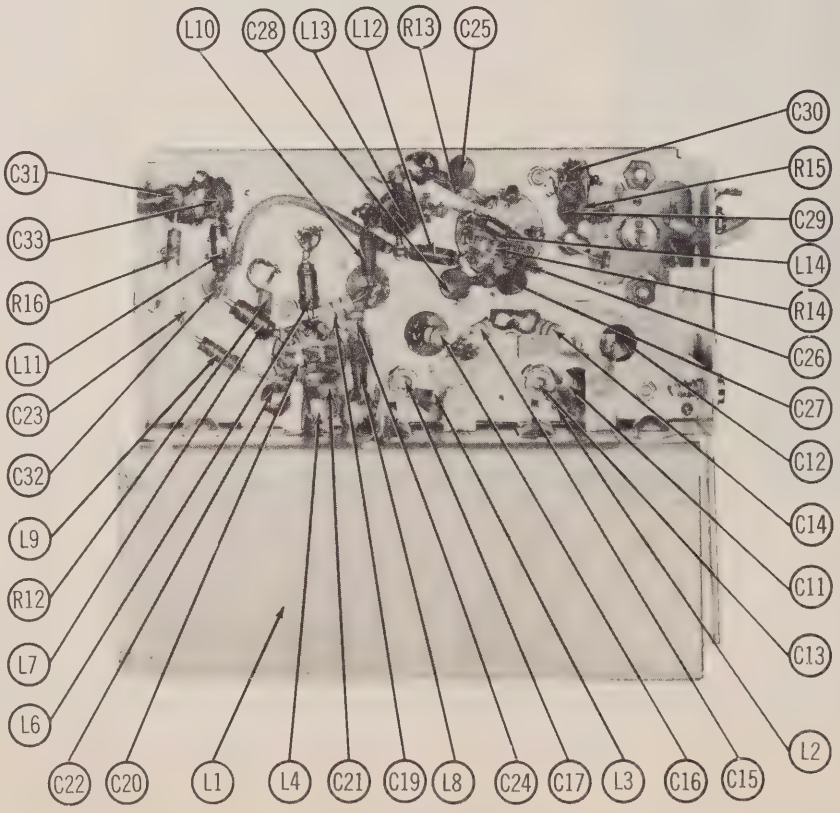
■ MEASURED IN UHF POSITION.
† MEASURED FROM PIN 2 OF V27.
▲ MEASURED FROM TOP CAP OF V24.



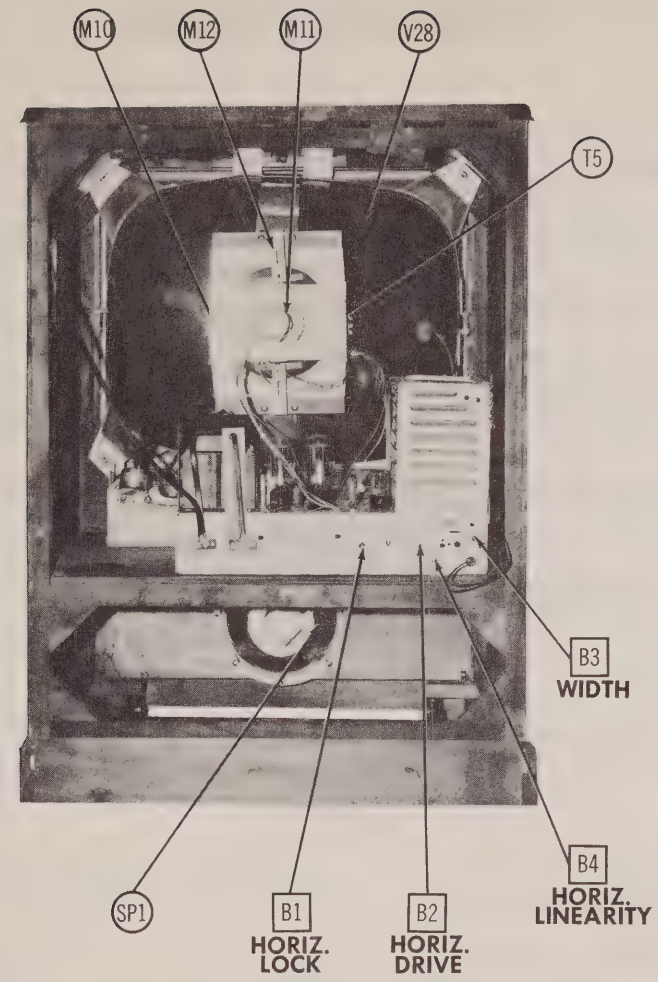
TUBE PLACEMENT CHART



UHF- TUNER-TOP VIEW



UHF-TUNER-BOTTOM VIEW



DENVER, COLORADO

CABINET—REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Turn the set on and tune in a TV station, preferably a test pattern.

Set horizontal hold control to its mid-range position. Adjust the horizontal lock slug (B1) until the picture synchronizes horizontally. Turn B1 clockwise until picture loses sync. Then slowly turn B1 counter clockwise until picture just pulls into sync.

Momentarily switch to another channel and back, first with the horizontal hold at one extreme of rotation, then at the other extreme. Picture should lose sync at either extreme. If necessary, make slight readjustment of B1 to center the sync range of the horizontal hold control.

Adjust the horizontal drive trimmer (B2) counter clockwise as far as possible without the presence of a vertical white line or compression of the center of the picture.

Adjust the width slug (B3) for a picture that is slightly wider than necessary to fill the picture mask horizontally.

Adjust the linearity slug (B4) for a picture that is symmetrical from left to right.

VERTICAL PEAKING (R7)

Adjust height and vertical linearity controls for normal picture. Set contrast control fully counter clockwise and adjust brightness so that picture can be seen. Adjust centering so that top of raster becomes visible .

Adjust the vertical peaking control (R7) so that 4 or 5 faint horizontal lines can be seen at top of picture. These lines should cover approximately $\frac{1}{2}$ inch vertically. This adjustment provides equal spacing of the individual raster lines.

TROUBLE SHOOTING AIDS

SWEEP

HORIZONTAL

LOSS OF SWEEP

Follow procedure outlined under "Loss of High Voltage".

INSUFFICIENT SWEEP

Check by substitution V22, V23, V24, V26 and V27. Check adjustments B2, B3 and B4. Check waveform W18.

If Satisfactory	If Unsatisfactory
Check T3, T5A, R144, R145, R146, R147, C131, C132, C133 and other associated circuit components.	Check C128, C129, C130, R141, R138 and other associated circuit components.

DRIVE LINES

Check adjustment B2. Check by substitution V22, V23 and V24. Check components associated with the horizontal output and damper stages especially T3, T5A, C132 and C133.

COMPRESSED LEFT SIDE

Check by sbustitution V23 and V24. Check adjustments B2, B3, and B4. Check T3, T5A, C132, C133, C135 and other associated components.

FOLDS

Follow procedure outlined under "Drive Lines".

XMAS TREE EFFECT

Substitute V22 Check C127, C128, L48 and other associated components for failure or change of value.

VERTICAL

LOSS OF SWEEP

Check by substitution V19 and V20. Check waveform W12.

If Satisfactory	If Unsatisfactory
Check T4, T5B, R156 and other associated circuit components.	Check C115, C116, R6B, R119, R122 and other associated circuit components.

INSUFFICIENT SWEEP

Check by substitution V19 and V20. Check adjustment of height and vertical linearity controls. Proceed as outlined under "Loss of Sweep".

COMPRESSED AT BOTTOM

Check by substitution V19 and V20. Check C3D for open. Check other associated components.

EXPANDED VERTICALLY

Check C116 for leakage.

COMPRESSED AT TOP

Check by substitution V19 and V20. Check T4, T5B and other associated components.

FOLDS

Check by substitution V19 and V20. Check components associated with V19B and V20.

SYNC

LOSS OF HORIZONTAL AND VERTICAL SYNC

Check by substitution V18, V19 and V11. Check components associated with these stages.

LOSS OF HORIZONTAL SYNC-VERTICAL SYNC SATISFACTORY

Check by substitution V21 and V22. Check associated circuit components especially C126, C127, and C128.

LOSS OF VERTICAL SYNC-HORIZONTAL SYNC SATISFACTORY

Check by substitution V19, V18 and V11. Check waveform at W10.

If Satisfactory	If Unsatisfactory
Check components associated with V19B.	Check vertical integrator network and other associated components.

HORIZONTAL BENDING

Substitute V21, V22 and V23. Check circuit near these stages for filament lead dress shorts. Check horizontal AFC filter network (C123, C124, R132, R133) for failure or change of value.

VIDEO

LOSS OF VIDEO

Check by substitution V9 and V10. Check components associated with these stages. Check picture tube.

SOUND BARS (4.5MC BEAT)

Check adjustment of fine tuning. Check adjustment A15. Check video IF alignment.

POOR CONTRAST

Check by substitution V9 and V10. Check video detector crystal and assembly. Check picture tube and other associated components.

NEGATIVE PIX

Check by substitution V9, V10, V11 and V12. Check adjustment of AGC threshold and AGC bias controls. Check components associated with V9, V10, V11, and V12. Check video detector assembly.

SMEAR

Check by substitution V9 and V10. Check video detector crystal and assembly. Check C82, C84, C6, R50, R53, R54, R57, R69, R49, R1A, L40, L42, L44, picture tube and other associated circuit components.

WIDE BLACK BAR ACROSS PIX

Check V3, V4, V5, V6, V7, V8, V9 and V10 for heater to cathode leakage. In case of UHF check V1 and V2.

AUDIO

WEAK OR NO SOUND

Check by substitution V13, V14, V15, V16, and V17. Check stages of V16 and V17 using audio signal generator. Apply audio signal across R96.

If Satisfactory	If Unsatisfactory
Check ratio detector and audio IF alignment and components.	Check components associated with V16 and V17.

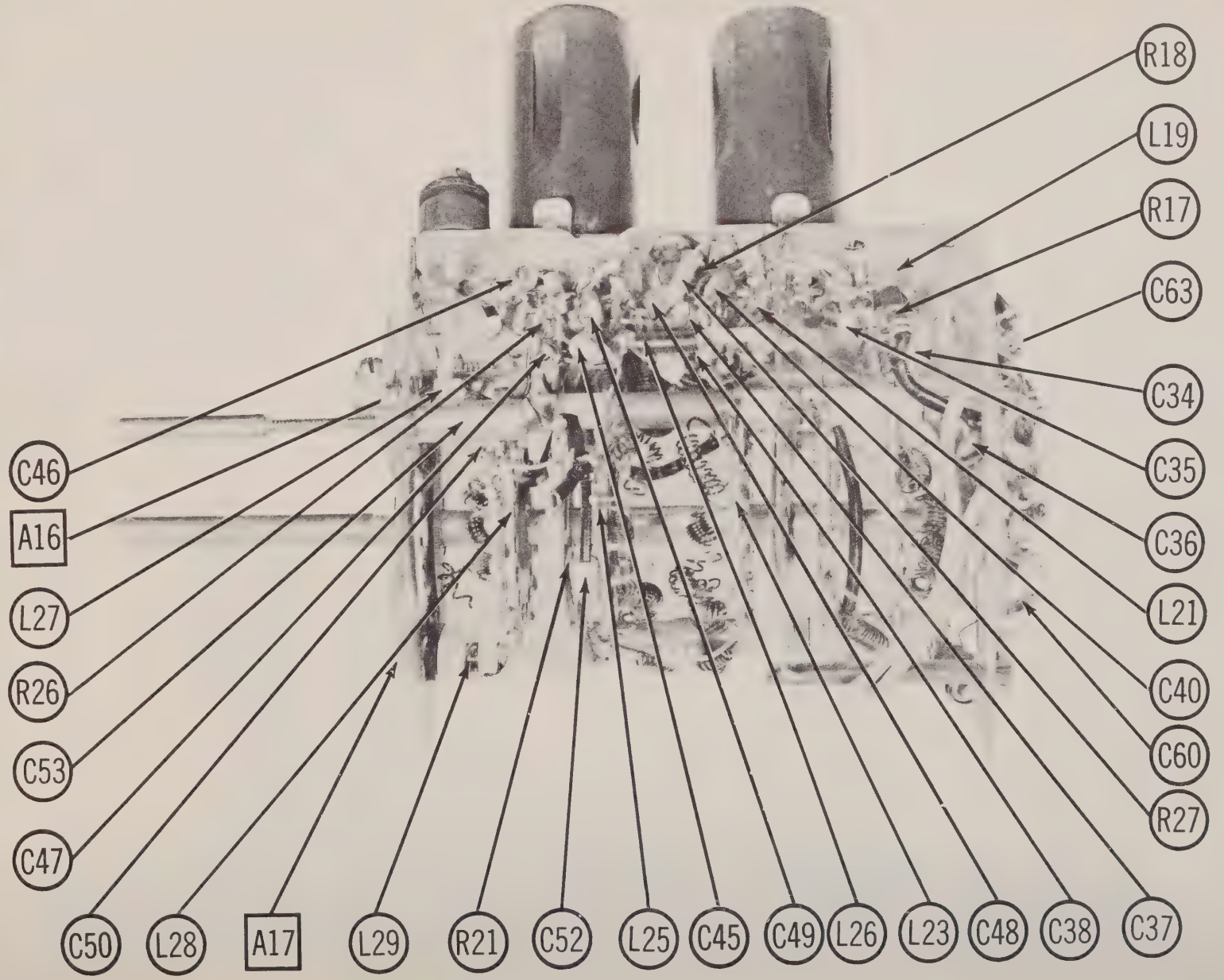
BUZZ

Check adjustment of fine tuning. Adjust A14 for minimum buzz. If still unsatisfactory, substitute V15 and realign audio IF and ratio detector. Check C8.

DISTORTED

Follow procedure outlined uner "Weak or No Sound".

ARVIN
MODELS 7276CB-UHF, 7279CM-UHF (Ch. TE-340, -1, -2)
ALTERNATE UHF TUNER SCHEMATIC
ALTERNATE UHF TUNER USED WITH TUNER PART NO AE25267-B
UHF IF AMP
6BZ7 6BQ7 6BQ7A
UHF OSC
6AF4
TO PRIMARY OF L16
TO JUNCT OF R78,R79,R80A, C64 THRU CHANNEL SELECTOR SW
TO JUNCT OF L26 & L20
245V
CATH
IN110 IN82 OR IN72
TO UHF ANT
TO TUNER
TO ANT
IF AM FM TRAP ASSY PART NO.C29983
A PHOTOFACT STANDARD NOTATION SCHEMATIC
© Howard W. Sams & Co., Inc. 1954



VHF TUNER-RIGHT SIDE

PARTS LIST AND DESCRIPTIONS
TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

ITEM No.	USE	REPLACEMENT DATA: ARVIN PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RETMA BASE TYPE	NOTES
V1	UHF Oscillator	6AF4	6AF4	7DK	
V2A	UHF IF Amp.	6BZ7	6BZ7	9AJ	
B	UHF IF Amp.	6BQ7	6BQ7	9AJ	
V3A	RF Amplifier	6BZ7	6BZ7	9AJ	
B	RF Amplifier	6BQ7	6BQ7	9AJ	
V4	Converter	6X8	6X8	9AK	
V5	1st Video IF Amp.	6AU6	6AU6	7BK	
V6	2nd Video IF Amp.	6CB6	6CB6	7CM	
V7	3rd Video IF Amp.	6CB6	6CB6	7CM	
V8	4th Video IF Amp.	6CB6	6CB6	7CM	
V9	Video Amp.	6AU6	6AU6	7BK	
V10	Video Output	6AQ5	6AQ5	7BZ	
V11	AGC Amplifier - Noise Inverter	12AX7	12AX7	9A	
V12	AGC Keying	6AU6	6AU6	7BK	
V13	Sound IF Amp.	6AU6	6AU6	7BK	
V14	Limiter	6AU6	6AU6	7BK	
V15	Ratio Detector	6AL5	6AL5	6BT	
V16	AF Amplifier - AGC Clamper	6AT6	6AT6	7BT	
V17	Audio Output	6AQ5	6AQ5	7BZ	
V18	Sync Separator - Sync Amplifier	12AU7	12AU7	9A	
V19	Sync Phase Inv. - Vert. Oscillator	6SN7GT	6SN7GT	8BD	
V20	Vert. Output	6BX7GT	6BX7GT	8BD	
V21	Horiz. AFC	6AL5	6AL5	6BT	
V22	Horiz. Mult.	6SN7GT	6SN7GT	8BD	
V23	Horiz. Output	6CD6G	6CD6G	5BT	
V24	Damper	6V3	6V3	9BD	
V25	HV Rectifier	1B3GT	1B3GT	3C	
V26	LV Rectifier	5U4G	5U4G	5T	
V27	LV Rectifier	5U4G	5U4G	5T	

CATHODE-RAY TUBE

ITEM No.	REPLACEMENT DATA: ARVIN PART No.	REPLACEMENT DATA: SYLVANIA PART No.	REPLACEMENT DATA: GENERAL ELECTRIC PART No.	REPLACEMENT DATA: WESTINGHOUSE PART No.	RETMA BASE TYPE	NOTES
V28	27EP4	27EP4 27GP4 27RP4	27EP4		12D 12D 12D	① Circuit changes necessary

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: ARVIN PART No.	REPLACEMENT DATA: AEROVOX PART No.	REPLACEMENT DATA: CENTRALAB PART No.	REPLACEMENT DATA: CORNELL-DUBILIER PART No.	REPLACEMENT DATA: ERIE PART No.	REPLACEMENT DATA: MALLORY PART No.	REPLACEMENT DATA: SPRAGUE PART No.	NOTES
C1A	■40	450	E22422-16	AFH4-84		DO65		FP431.4	TVL-4745	
B	▲50	450								
C	▲5	450								
D	20	25								
C2A	■40	450	E22422-18	AFH1-52		A048		FP146	TVL-1725	
B	▲5	450		PRS450/4		BR445		TC70	TVA-1702	
C3A	▲50	450	E22422-19	AFH3-45		CO36		FP391.1	TVL-3789	Note 1
B	■25	350		PRS50/100		BRH501		TC3501	TVA-1310	
C	▲25	350								
D	100	50								
C4	3000	15	E22422-16	AFH1-04		A008		WP042	TVL-1170	
C5	20	450	A25452	PRS450/20		BR2045		TC75	TVA-1709	
C6	5	450	A40847	PRS450/4		BR445		TC70	TVA-1702	Note 2
C7	4	150	A25453	PRS150/4		BR415		TC40	TVA-1402	
C8	4	150	A25453	PRS150/4		BR415		TC40	TVA-1402	
C9	4	150	A25453	PRS150/4		BR415		TC40	TVA-1402	
C10	4	150	A25453	PRS150/4		BR415		TC40	TVA-1402	
C11	.7		25675-1		TCZ-.68		NP0K-R68			
C12	.7		25675-1		TCZ-.68		NP0K-R68			
C13	.4-3		25719-1							
C14	1		25675-2							
C15	.8		25675-6							
C16	1.8		25675-8							
C17	.4-3		25719-1							
C18	2.2		25675-4							
C19	1.1		25675-9							
C20	6		25718-1							
C21	12		25678-1							
C22	.5-3		25690-1		829-3			CT565A		
C23	70		25655-7	SI68	D6-680		GP1K-680	UC-5468	5GA-Q68	
C24	1		25675-2							
C25	1000		23078	BPD-001	DD-102	TM5D1	801-001	DC-521	5HK-D1	
C26	1000		23078	BPD-001	DD-102	TM5D1	801-001	DC-521	5HK-D1	
C27	1000		23078	BPD-001	DD-102	TM5D1	801-001	DC-521	5HK-D1	
C28	1000		23078	BPD-001	DD-102	TM5D1	801-001	DC-521	5HK-D1	
C29	1000		23078	BPD-001	DD-102	TM5D1	801-001	DC-521	5HK-D1	
C30	1000		25671	EF-001	MFT-1000				503C-D1	
C31	1000		25671	EF-001	MFT-1000				503C-D1	
C32	70		25655-7	SI68	D6-680		GP1K-680	UC-5468	5GA-Q68	
C33	1000		25671	EF-001	MFT-1000				503C-D1	
C34	15			SI15	D6-150		GP1K-150	UC-5415	5GA-Q15	
C35	3									
C36	800			BPD-0008	DD-102	TM5T8	801-001	DC-521	5HK-D1	
C37	470			BPD-00047	D6-471		GP2K-471	UC-5347	5GA-T47	
C38	1000			EF-001	MFT-1000				503C-D1	
C39	800			BPD-0008	DD-102	TM5T8	801-001	DC-521	5HK-D1	
C40	800			BPD-0008	DD-102	TM5T8	801-001	DC-521	5HK-D1	
C41	.4									
C42	.3									
C43	1									
C44	15			SI15	D6-150		GP1K-150	UC-5415	5GA-Q15	
C45	.8									

PROPERTY
L. F. BLANKEN
3924 MEADE ST
DENVER, COLORADO

PARTS LIST AND DESCRIPTIONS (Continued)

CAPACITORS (cont)

ITEM No.	RATING CAP.	RATING VOLT	REPLACEMENT DATA ARVIN PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C46	1.5			SILON750	TCN-10		N750K-100	NT-541	5TCU-Q1	
C47	10			BPD-001	DD-102	TM5D1	801-001	DC-521	5HK-D1	
C48	1000			BPD-0008	DD-102	TM5T8	801-001	DC-521	5HK-D1	
C49	800									
C50	1.5									
C51	.1									
C52	.1									
C53	1-8									
C54	1000			BPD-001	DD-102	TM5D1	801-001	DC-521	5HK-D1	
C55	10			SILONP0	TCZ-10		NP0K-100	ZT-541	5TCC-Q1	
C56	800			BPD-0008	DD-102	TM5T8	801-001	DC-521	5HK-D1	
C57	100									
C58	10									
C59	1000			BPD-001	DD-102	TM5D1	801-001	DC-521	5HK-D1	
C60	1000			BPD-001	DD-102	TM5D1	801-001	DC-521	5HK-D1	
C61	1000			BPD-001	DD-102	TM5D1	801-001	DC-521	5HK-D1	
C62	1000			BPD-001	DD-102	TM5D1	801-001	DC-521	5HK-D1	
C63	1000			BPD-001	DD-102	TM5D1	801-001	DC-521	5HK-D1	
C64	.1	400	D25462-104	P488-1	DF-104	PTE4P1		PT401	4TM-P1	
C65	4700		D40053-473	BPD-0047	DD-502	TM5D5	811-005	DC-525	5HK-D47	
C66	4700		D40053-473	BPD-0047	DD-502	TM5D5	811-005	DC-525	5HK-D47	
C67	3.3		D40355-1	SI3.3NP0	TCZ-3.2		NP0K-3R2		5TCCB-V32	
C68	4700		D40053-473	BPD-0047	DD-502	TM5D5	811-005	DC-525	5HK-D47	
C69	4700		D40053-473	BPD-0047	DD-502	TM5D5	811-005	DC-525	5HK-D47	
C70	4700		D40053-473	BPD-0047	DD-502	TM5D5	811-005	DC-525	5HK-D47	
C71	4700		D40053-473	BPD-0047	DD-502	TM5D5	811-005	DC-525	5HK-D47	
C78A	4700		D40055-1	BPD-2X0047	DD2-502	TM5DD5	822-005	DCD-525	5HK-2D47	
B	4700									
C73	4700		D40053-473	BPD-0047	DD-502	TM5D5	811-005	DC-525	5HK-D47	
C74A	4700		D40055-1	BPD-2X0047	DD2-502	TM5DD5	822-005	DCD-525	5HK-2D47	
B	4700									
C75	4700		D40053-473	BPD-0047	DD-502	TM5D5	811-005	DC-525	5HK-D47	
C76	1500		D40095	CS-1Z-0015					50IC-D15	
C77	4700		D40053-473	BPD-0047	DD-502	TM5D5	811-005	DC-525	5HK-D47	
C78A	4700		D40055-1	BPD-2X0047	DD2-502	TM5DD5	822-005	DCD-525	5HK-2D47	
B	4700									
C79	10000		D40053-103	BPD-01	DD-103	TM5I	811-01	DC-511	5HK-S1	
C80	10000		D40053-103	BPD-01	DD-103	TM5I	811-01	DC-511	5HK-S1	Note 3
C81	56	500	C20411-560							
C82	.047	400	D25462-473	P488-047	DF-503	PTE4S47		PT4147	4TM-S47	
C83	47			SI47NP0	TCZ-47		NP0K-470	ZT-5447	5TCC-Q47	
C84	.047	400	D25462-473	P488-047	DF-503	PTE4S47		PT4147	4TM-S47	
C85	.22	400	D25462-224	P488-22		PTE4P22		PT4025	4TM-P22	
C86	1000	1000	D40108-103	HVD15-001					10GA-D1	
C87	4700		D40053-473	BPD-0047	DD-502	TM5D5	811-005	DC-525	5HK-D47	
C88	.047	300	D25455-473	P288-047	DF-503	PTE4S47		PT4147	3TM-S47	
C89	10000		D40053-103	BPD-01	DD-103	TM5I	801-01	DC-511	5HK-S1	
C90	10000		D40053-103	BPD-01	DD-103	TM5I	801-01	DC-511	5HK-S1	
C91	10000		D40053-103	BPD-01	DD-103	TM5I	801-01	DC-511	5HK-S1	
C92	10000		D40053-103	BPD-01	DD-103	TM5I	801-01	DC-511	5HK-S1	
C93	56		D25530-12	S156	D6-560	GP1K-560	UC-5456	5GA-Q56		
C94	10000		D40053-103	BPD-01	DD-103	TM5I	801-01	DC-511	5HK-S1	
C95	10000		D40053-103	BPD-01	DD-103	TM5I	801-01	DC-511	5HK-S1	
C96	10000		D40053-103	BPD-01	DD-103	TM5I	801-01	DC-511	5HK-S1	
C97	500	500	C20290-501	B468-0005	D6-501	5W5T5	GP2K-501	MC345	1FM-35	
C98	1000		D40054-103	BPD-001	DD-103	TM5D1	801-001	DC-521	5HK-D1	
C99	10000		D40053-103	BPD-01	DD-103	TM5I	811-01	DC-511	5HK-S1	
C100	2000		D40054-202	BPD-002	DD-202	TM5D2	801-002	DC-523	5HK-D2	
C101	3300		D40054-333	D6-332	D6-332		GP2-333-332	UC-5233	5HK-D33	
C102	2000		D40054-202	BPD-002	DD-202	TM5D2	801-002	DC-523	5HK-D2	
C103	270	500	C20290-271	B469-0003		5R5T3		MCB241	M3-33	
C104	10000		D40053-103	BPD-01	DD-103	TM5I	811-01	DC-511	5HK-S1	
C105	4700	1000	D40108-472	HVD15-0047					10HK-D47	
C106	.022	200	D25455-223	P288-022	DF-203	PTE4S22		PT4122	4TM-S22	
C107	10000		D40053-103	BPD-01	DD-103	TM5I	811-01	DC-511	5HK-S1	
C108	.047	400	D25462-473	P488-047	DF-503	PTE4S47		PT4147	4TM-S47	
C109	270	500	C20290-271	B469-0003		5R5T3		MCB241	M3-33	
C110	.047	400	D25462-473	P488-047	DF-503	PTE4S47		PT4147	4TM-S47	
C111	.22	200	D25455-474	P288-47		PTE5P5		PT405	2TM-P47	
C112A	.0022					PTE5D22		PT5222		
B	.0047		⊕C24186	⊕PC-100	⊕PC-100	PTE5D47	⊕1405-01	PT5247	⊕401C1	
C	.0047					PTE5D47		PT5247		
C113	.0047	600	C20324-472	M64-005		IDR5D5		MCB465	M3-25	
C114	1500		D40054-152	BPD-0015	DD-152	TM5D15	801-0015	DC-5215	5HK-D15	
C115	.047	600	D25461-473	P688-047		PTE6S47		PT6147	6TM-S47	
C116	.1	600	D25461-104	P688-1	DF-104	PTE6P1		PT601	6TM-P1	
C117	.1	300	D25455-104	P288-1	DF-104	PT2P1		PT401	2TM-P1	
C118	.1	1000	D25470-104	P1068-1		PTE10P1		PT1601	M3-P1	
C119	.1	600	D25461-104	P688-1	DF-104	P688-1		PT601	6TM-P1	
C120	1000		D40054-102	BPD-001	DD-102	TM5D1	801-001	DC-521	5HK-D1	
C121	1000		D40054-102	BPD-001	DD-102	TM5D1	801-001	DC-521	5HK-D1	
C122	.01	400	D25462-103	P488-01	D6-103	PTE4S1	GP2-333-103	PT401	4TM-S1	
C123	4700		D40054-473	BPD-0047	DD-502	TM5D5	811-005	DC-525	5HK-D5	
C124	.047	200	D25455-473	P288-047	DF-503	PTE4S47		PT4147	4TM-S47	
C125	.047	600	D25461-473	P688-047	DF-503	PTE6S47		PT6147	6TM-S47	Note 3
C126	100	500	C20290-101	B469-0001		5R5T1		MCB231	M3-31	
C127	3900	500	C20433-392	M64-004		IDR5D4		MCB463	M3-24	
C128	330	500	C20331-331	B469-00035						
C129	330	500	C20290-331	B469-00035						
C130	370	500	C20290-371	B469-0003		5R5T3		MCB341	M3-33	
C131	.22	400	D25462-224	P488-22		PTE4P22		PT4025	4TM-P22	
C132	.047	600	C20324-473	P688-047		PTE6S47		PT6147	6TM-S47	
C133	.047	600	C20324-473	P688-047		PTE6S47		PT6147	6TM-S47	
C134	500	20000	A24294	HV30C	TV3-502	MMC-3075	413-501	HV30035A	30DX-T5	
C135	.22	400	D25462-224	P488-22		PTE4P22		PT4025	4TM-P22	
C136	130	5000								
C137	130	5000								Note 3
C138	100	1000		HVD30-0001					30GA-T1	
C139	.047	600	D25461-473	P688-047	DF-503	PTE6S47		PT6147	6TM-S47	
C140	.22	600	D25461-224	684-25		PTE6P22		PT6025	6TM-P25	
C141	4700		D40054-472	BPD-0047	DD-502	TM5D5	811-005	DC-525	5HK-D47	
C142	10000	1000	D40108-103		DD10-103				10HK-S1	
C143	10000	1000	D40108-103		DD10-103				10HK-S1	

Note 1. In some Models C3A is 60MFD (C3 part no, is then 232423-17).
Note 2. Some Models use a 350V unit in this application (part #A40002).
Note 3. Not used in all Models.
⊕ Items C112A, C112B, C112C, R14A, R14B, R14C are combined in one unit.

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA ARVIN PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No	INSTALLATION NOTES
R1A	2500Ω	½	E23464-44	* QJ-365				Contrast (panel)
B	3 Meg	½	Not Req.					Volume & switch (rear)
R2A	1.5Meg	½	E23464-29	QU-138	AG-83-8	AB-75	U-155	Vert. Hold
B	Shaft		Not Req.	Not Req.	KS8-3	AK-4	Not Req.	Attach to R2A
R3A	500Ω	½	E23464-45	QU-131	AG-42-8	AB-31	U-35	Horiz. hold
B	Shaft		Not Req.	Not Req.	KS8-3	AK-4	Not Req.	Attach to R3A
R4A	100KΩ	½	E23464-18	QU-128	AG-69-8	AB-40	U-41	Brightness
B	Shaft		Not Req.	Not Req.	KS8-3	AK-4	Not Req.	Attach to R4A
R5	2 Meg	½	E23464-19					Tone & phono switch
R6A	3000Ω	½	E23464-20	* QJ-71	RTV-259			Vert. linearity (panel)
B	2.5Meg	½	Not Req.					Height (rear)
R7	3000Ω	1	A40118		39-3000			Vert. peaking
R8A	3 Meg	½	E23464-47	QU-140	AG-85-8	AB-84	SU-58	AGC
B	Shaft		Not Req.	RQ	FKS-1/4	AK-1	Not Req.	Attach to R8A
R9A	15KΩ	½	E23464-48	QU-119	AG-32-8	AB-32	SU-29	Bias
B	Shaft		Not Req.	RQ	FKS-1/4	AK-1	Not Req.	Attach to R9A

* CONCENTRIKIT EQUIVALENT KIT-K-3 BASE ELEMENTS & SHAFTS W11-113 & P3-114 (panel)

* CONCENTRIKIT EQUIVALENT KIT-K-2 BASE ELEMENTS & SHAFTS B17-111 & P1-204 (panel)
B18-140X & R1-220 (rear) & SWITCH 76-1.

RESISTORS

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA ARVIN PART No.	IRC PART No.	NOTES
R10	100KΩ	½		BTS-100K	
R11	100KΩ	½		BTS-100K	
R12	10KΩ	½		BTS-10K	
R13	100Ω	½		BTS-100	
R14	470KΩ	½		BTS-470K	
R15	1000Ω	½		BTS-1000	
R16	1000Ω	½		BTS-1000	
R17	4700Ω	½		BTS-4700	
R18	1Meg 5%	½		BTS-1Meg 5%	
R19	750KΩ 5%	½		BTS-750K 5%	
R20	1000Ω	½		BTS-1000	
R21	3900Ω	½		BTS-3900	
R22	220KΩ	½		BTS-220K	
R23	2200Ω	½		BTS-2200	
R24	1000Ω	½		BTS-1000	
R25	4700Ω	½		BTS-4700	
R26	15KΩ	½		BTS-15K	
R27	220Ω	½		BTS-220	
R28	22Ω	½		BTS-22	
R29	4700Ω	½	C22381-472	BTS-4700	
R30	68000Ω 5%	½	C22382-683	BTS-68000 5%	
R31	100Ω 5%	½	C22382-101	BTS-100 5%	
R32	1000Ω	½	C20061-102	BTS-1000	
R33	33KΩ	½	C22381-333	BTS-33K	
R34	1000Ω	½	C20061-102	BTS-1000	
R35	1000Ω	½	C20061-102	BTS-1000	
R36	1000Ω	½	C20061-102	BTS-1000	
R37	560 5%	½	C22382-561	BTS-560 5%	
R38	33KΩ	½	C22381-333	BTS-33K	
R39	1000Ω	½	C20061-102	BTS-1000	
R40	6800Ω	½	C22382-682	BTS-6800	
R41	68Ω 5%	½	C22382-680	BTS-68 5%	
R42	4700Ω	½	C22381-472	BTS-4700	
R43	1000Ω	½	C22381-102	BTS-1000	
R44	56KΩ	½	C22381-563	BTS-56K	
R45	180Ω	½	C22381-181	BTS-180	
R46	1000Ω	½	C20061-102	BTS-1000	Note 1
R47	6800Ω	1	C20070-682	BTA-6800	
R48	3900Ω 5%	½	C22382-392	BTS-3900 5%	
R49	47Ω	½	C22381-470	BTS-47	
R50	1Meg	½	C22381-105	BTS-1Meg	
R51	5600Ω			BTS-5600	Note 2
R52	5600Ω	½		BTS-5600	Note 3
R53	4700Ω 5%	2	C25467-472	BTB-4700 5%	
R54	4700Ω 5%	2	C25467-472	BTB-4700 5%	
R55	1000Ω	3	C20303-102	BTB-1000	
R56	100KΩ	½	C20061-104	BTS-100K	
R57	470KΩ	½	C20061-474	BTS-470K	
R58	1Meg	½	C20061-105	BTS-1Meg	
R59	120KΩ	½	C22381-124	BTS-120K	
R60	33KΩ	½	C22381-333	BTS-33K	
R61	68KΩ	½	C22381-683	BTS-68K	
R62	2700Ω 5%	½	C22382-272	BTS-2700 5%	
R63	1500Ω 5%	½	C22382-152	BTS-1500 5%	
R64	56KΩ	½	C22381-563	BTS-56K	
R65	22KΩ	½	C22381-563	BTS-56K	
R66	33KΩ	½	C22381-333	BTS-33K	
R67	2700Ω 5%	½	C22382-272	BTS-2700 5%	
R68	56000Ω			BTS-5600	Note 2
R69	39000Ω 5%	½	C22382-392	BTS-3900 5%	
R70	120KΩ 5%	½	C22382-124	BTS-120K 5%	
R71	10KΩ	½	C22382-103	BTS-10K	
R72	220KΩ	½	C22381-124	BTS-220K	Note 4
R73	120KΩ 5%	½	C22382-124	BTS-120K 5%	
R74	120KΩ 5%	½	C22382-134	BTS-120K 5%	
R75	10KΩ 5%	½	C22382-103	BTS-10K 5%	
R76	33KΩ 5%	½	C22382-333	BTS-33K 5%	
R77	3.6Meg 5%	½	C22382-855	BTS-3.6Meg 5%	
R78	16KΩ 5%	2	C25467-163	BTB-16K 5%	
R79	15KΩ 5%	2	C25467-153	BTB-15K 5%	
R80	10KΩ 5%	2	C25467-103	BTB-10K 5%	
R81	1000Ω		C20061-102	BTS-1000	
R82	470KΩ		C20061-474	BTS-470K	
R83	820 5%	½	C22382-820	BTS-82 5%	
R84	1000Ω		C20061-102	BTS-1000	
R85	1000Ω		C20061-102	BTS-1000	
R86	47KΩ		C22381-473	BTS-47K	
R87	68Ω 5%	½	C22382-680	BTS-68 5%	

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA ARVIN PART No.	IRC PART No.	NOTES
R88	56KΩ	½	C20303-563	BTS-56K	
R89	33KΩ	½	C22381-333	BTS-33K	
R90	1000Ω	½	C20061-102	BTS-1000	
R91	3900 5%	½	C22382-391	BTS-390 5%	
R92	47KΩ	½	C22381-473	BTS-47K	
R93	10KΩ 5%	½	C22382-103	BTS-10K 5%	
R94	10KΩ 5%	½	C22382-103	BTS-10K 5%	
R95	220KΩ	½	C20061-223	BTS-220K	
R96	10Meg	½	C20061-106	BTS-10Meg	
R97	150KΩ	½	C20061-154	BTS-150K	
R98	100KΩ	½	C20061-104	BTS-100K	
R99	470KΩ	½	C20061-474	BTS-470K	
R100	330Ω	1	C20070-331	BTA-330	
R101	15KΩ	½	C22382-153	BTS-15K	
R102	2000Ω	5	C23970-18	1 3/4A-2000	
R103	150KΩ	½	C20061-154	BTS-150K	
R104	2.2Meg	½	C22381-225	BTS-2.2Meg	
R105	47KΩ	1	C20070-473	BTA-47K	
R106	270KΩ	½	C22381-274	BTS-270K	
R107	560KΩ	½	C22381-564	BTS-560K	
R108	22KΩ	½	C22381-223	BTS-22K	
R109	47KΩ	½	C22381-473	BTS-47K	
R110	1100Ω 5%	½		BTS-1100 5%	
R111	4700Ω	½	C22381-472	BTS-4700	
R112	820Ω	½	C22382-821	BTS-820	
R113	1800Ω	½	C22382-182	BTS-1800	
R114A	22KΩ	½		BTS-22K	
B	8200Ω	½	⊕ C24186	BTS-8200	
C	820Ω	½		BTS-820Ω	
R115	22KΩ	½	C22381-223	BTS-22K	
R116	1.5Meg 5%	½	C22382-155	BTS-1.5Meg 5%	
R117	470KΩ	½	C22381-474	BTS-470K	
R118	100KΩ	½	C22381-104	BTS-100K	
R119	1.5Meg 5%	½	C22382-155	BTS-1.5Meg 5%	
R120	10Meg	½	C22381-106	BTS-10Meg	
R121	9100Ω 5%	½	C22382-912	BTS-9100 5%	
R122	2.2Meg	½	C22381-225	BTS-2.2Meg	
R123	560Ω	½		BTS-560	
R124	560Ω	½		BTS-560	
R125	560Ω	½		BTS-560	
R126	15KΩ	½	C22382-153	BTS-15K	
R127	100KΩ 5%	½	C22382-104	BTS-100K 5%	
R128	100KΩ 5%	½	C22382-104	BTS-100K 5%	
R129	56KΩ	2	C20302-563	BTB-56K	
R130	56KΩ	2	C20302-563	BTB-56K	
R131	56KΩ	3	C20302-563	BTB-56K	Note 5
R132	4.7Meg	½	C22381-475	BTS-4.7Meg	
R133	1Meg	½	C22381-105	BTS-1Meg	
R134	47KΩ	½		BTS-47K	Note 5
R135	1200Ω	1	C22381-122	BTB-1200	
R136	8200Ω	1	C20070-822	BTA-8200	
R137	100KΩ 5%	½	C22382-104	BTS-100K 5%	
R138	120KΩ	½	C22381-124	BTS-120K	
R139	8200Ω	2	C22381-822	BTS-8200	
R140	47Ω	1	C20061-470	BTS-47	
R141	470KΩ	½	C22381-474	BTS-470K	
R142	300Ω	7	1 3/4A -300		
R143	47Ω	1	C20061-470	BTS-47	
R144	27KΩ	3	C20320-273	BTB-27K	
R145	27KΩ	3	C20320-273	BTB-27K	
R146	27KΩ	2	C20320-273	BTB-27K	
R147	27KΩ	3	C20320-273	BTB-27K	
R148	47KΩ	2	C22381-473	BTS-47K	
R149	10Ω	1	C20380-100		
R150	470KΩ	1	C20070-474	BTA-470K	
R151	50Ω	5	C23970-6	1 3/4A-50	
R152	220KΩ	½	C20061-224	BTS-220K	
R153	25Ω	14	C23970-20	2D-25	
R154	150Ω	14	C23970-21	2D-150	
R155A	947Ω	6			
B	244Ω	5	C40032		
C	1150Ω	6			
R156	330Ω	1		BTA-330	
R157	470Ω	1		BTA-470	Note 5
R158	100KΩ	½		BTS-100K	
R159	560KΩ	½		BTS-560K	

⊕ Items R114A, R114B, R114C, C112A, C112B, C112C are combined in one unit.
Note 1. Some Models may use a 33KΩ resistor in this application.
Note 2. Some Models may use a 15KΩ resistor in this application.
Note 3. Some Models may use a 6800Ω resistor in this application.
Note 4. Some Models may use a 470KΩ resistor in this application.
Note 5. Not used in all Models.

TRANSFORMER (POWER)

ITEM No.	RATING PRI.	RATING SEC. 1	RATING SEC. 2	RATING SEC. 3	REPLACEMENT DATA ARVIN PART No.	STANCOR PART No.	MERIT PART No.	Halldorson PART No.	TRIAD PART No.	RCA TYPE No
T1	117VAC	700VCT .380ADC	5VAC ⑥ 6A	6.3VAC ⑤ 13.1A	E40598					

TRANSFORMER (SWEEP CIRCUITS)

ITEM No.	RATING DC RESISTANCE PRI.	RATING DC RESISTANCE SEC.	REPLACEMENT DATA ARVIN PART No.	STANCOR PART No.	MERIT PART No.	Halldorson PART No.	TRIAD PART No	RCA TYPE No.	NOTES
T2	190Ω	1050Ω	C-32448-1	A-8123①	A-4003	B6701	A-97X	208T9	
T3	433.7Ω tap ④ 2.3Ω, 3.7Ω, 14.2Ω, 15.8Ω, 23.7Ω	0Ω	E-40513					235T1	Horiz. Output Trans.
T4	1120Ω tap ② 13.6Ω		C-40470-1	A-8123 ①	A-3037 ①	Z1804 ①	A-102X ①	222T1 ①	Vert. Output Trans.
T5 A	14.4Ω		D-40537		MDF-90			219D1 ④	Horiz. Deflection Coils
B	42Ω								Vert. Deflection Coils
T6	8.5Ω		C-40533		MWC-6		WC-12 ③	215R1 ④	Horiz. Linearity
T7	27Ω	37Ω	C-40532	WC-5	MWC-1		WC-11	214R1 ④	Width

① Drill one new mounting hole.
② Drill new mounting hole .
③ Connect to coded blue and red terminals.
④ Use original deflection coil network and leads.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	RATING IMPEDANCE PRI	RATING IMPEDANCE SEC.	RATING DC RES. PRI.	RATING DC RES. SEC.	REPLACEMENT DATA ARVIN PART No.	STANCOR PART No.	MERIT PART No.	Halldorson PART No.	TRIAD PART No.	NOTES
T8	5.7KΩ	3.8Ω	478Ω	.86Ω	C24776-4	A-3877①	A-3019	Z1002	S-5X	① Drill one new mounting hole.

SPEAKER

ITEM No.	RATINGS SIZE	RATINGS FIELD	RATINGS V. C. IMP.	REPLACEMENT DATA ARVIN PART No.	VIKING PART No	QUAM PART No.	NOTES
SP1	10"	PM	3.8Ω	D25519	10J11	10A31	

COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA ARVIN PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
		PRI.	SEC.					
L1A	UHF Ant. Coil	0Ω						
B	UHF Mixer Coil	0Ω						
C	UHF Osc. Coil	0Ω						
L2	UHF Ant. Coil end inductor	0Ω						
L3	UHF Mixer Coil end inductor	0Ω						
L4	UHF Osc. Coil end inductor	0Ω						
L5	Parasitic Suppressor	0Ω		25349-3				
L6	FIL. Choke	0Ω		25672				Wound on 330Ω resistor
L7	FIL. Choke	0Ω		25672				Wound on 330Ω resistor
L8	Cathode Choke	0Ω		25349-2				
L9	RF Choke	0Ω		25349-2				
L10	Parasitic Suppressor	0Ω		25349-3				
L11	FIL. Choke	.3Ω		25349-1				
L12	FIL. Choke	.2Ω		25349-1				
L13	UHF IF Input tuning	0ΩCT		25669				
L14	Feedback Coil	.1Ω		25349-4				
L15	UHF IF Output trans.	0Ω		25670				Includes resistor & Cape.
L16	UHF IF Input trans.	0ΩCT	0Ω					
L17	VHF Antenna trans.	0ΩCT	0ΩCT					
L18	Ant. Coils	0Ω						
L19	Ant. Coil	0Ω						Channel 13
L20	FIL. Choke	.2Ω						.56 Microhenry IRC Part # CL-1
L21	Neutr. Coil	0Ω						
L22	RF Coils	0Ω						Channel 13
L23	RF Coils	0Ω						
L24	Mixer grid coil	0Ω						Channel 13
L25	Mixer grid coils	0Ω						
L26	FIL. Choke	0Ω						
L27	Osc. Plate coil	0ΩCT						Channel 13
L28	Osc. coils	0Ω						
L29	Osc. coil	0Ω						Channel 6

MODELS 7276CB-UHF, 7279CM-UHF (Ch. TE-340, -1, -2)

ARVIN

PARTS LIST AND DESCRIPTIONS (Continued)

COILS (cont)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA ARVIN PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L30	Conv. plate	0Ω						
L31	1st Video IF grid	0Ω		D40074	17-4531 *		6216 *	Includes trap, 22KΩ resistor, & .0047 MMF capacitor
L32	1st Video IF plate	.1Ω		D40070			6217	Includes 4.7KΩ resistor, trap, & 100MMF capacitor
L33	2nd Video IF grid	.1Ω		D40071			6218	Includes trap
L34	Fil. Choke	0Ω		A23095	19-3001	TV-189	6175	.6 Microhenry
L35	2nd Video IF plate	.3Ω	.3Ω	D40072	20-1045		6219	
L36	3rd Video IF	.3Ω	.3Ω	D40072	17-4523		6219	
L37	4th Video IF	.3Ω	.3Ω	D40073				Includes 10KΩ resistor, 1N64 crystal detector, 10MMF capacitor, & series peak. coil.
L38	Series Peak. Coil	3.4Ω		D25468-11	19-3075 †	TV-181 †	6172 †	72 Microhenries; wound on 3.3KΩ resistor
L39	Shunt. Peak. Coil	11Ω		D25468-12	19-3500 ■	TV-188 ■	6174 ■	500 Microhenries; wound on 6.8KΩ resistor
L40	Series Peak. Coil	6Ω			19-3180	TV-184	6180	185 Microhenries; Note 1
L41	Shunt Peak. Coil	8Ω		D25468-15	19-3500	TV-188	6174	500 Microhenries
L42	Series Peak. Coil	6Ω			19-3180	TV-184	6180	185 Microhenries; Note 1
L43	4.5MC Trap	1Ω		C25609	20-1004	TV-151	1470	
L44	Shunt. Peak. Coil	6Ω		D25468-1	19-3180	TV-184	6180	185 Microhenries
L45	1st Sound IF	7Ω (Tap @ 5.5Ω)		D40075	17-1025			Includes 10MMF cap capacitor
L46	2nd Sound IF	5Ω	3.1Ω	D40077	17-1021	TV-108 ▲	1466 ▲	
L47	Ratio Det.	3.5Ω	.3ΩCT	D25322	17-1033	TV-110	1468	Tertiary winding=.75Ω
L48	Horiz. Osc.	70Ω		A23449	19-1576	TV-163	6210	

Note 1. Some models use 185 Microhenries series peak. coil wound on 15KΩ resistor in this application (Arvin Part # D25468-14).
* Use secondary winding & trap winding only; add .0047MMF cap. externally.
† Parallel with 3.3KΩ resistor.
■ Parallel with 6.8KΩ resistor
▲ Drill one new mounting hole.

FILTER CHOKE

ITEM No.	RATINGS TOTAL DIRECT CURRENT	RATINGS D.C. RESISTANCE	RATINGS INDUCTANCE (0 CURRENT 1000 ~)	REPLACEMENT DATA ARVIN PART No.	STANCOR PART No.	MERIT PART No.	Halldorson PART No.	TRIAD PART No.
L49	.330A	45.6Ω	1.8 Hy.	C-22561-4			C-5037 ①	

① Drill one new mounting hole.

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA ARVIN PART No. FUSE	ARVIN PART No. HOLDER	LITTELFUSE PART No. FUSE	LITTELFUSE PART No. HOLDER	BUSS PART No. FUSE	BUSS PART No. HOLDER
M1	3AG S/B P/T	1/4A	A40663		315.250 (3AG S/B P/T 1/4A)		MDV 1/4	

MISCELLANEOUS

ITEM No.	PART NAME	ARVIN PART No.	NOTES
M2	Dial Light	A19351	#47 Bayonet - channel light
M3	Tuner	R40444-1	VHF part of AE25267-3 or AE25267-8 dual tuner
M4	Tuner		UHF part of AE25267-3 or AE25267-8 dual tuner
M5	Trap	C40916	127MC trap VHF antenna line (Note 1)
M6	Trap	C40364	Band elimination, filter UHF antenna line (Note 1)
M7	Crystal		1N64 Video Detector
M8	Crystal		1N82 UHF Mixer
M9	Switch	A22525	Local-Distance Selector (Slide)
M10	Focus Magnet		PM-Includes centering device
M11	Ion Trap	C25662-2	
M12	Correction Magnet	C40079-1	(2) used
B2	Trimmer Cap.		
	Control Door		Mahogany
	Control Door		Blonde
	Knob	D25077-1	Channel Indicator - Mahogany
	Knob	D25077-3	Channel Indicator - Blonde
	Knob	D25094-1	Fine tuning - Mahogany
	Knob	D25094-3	Fine tuning - Blonde
	Knob	D25736-1	Volume - Mahogany
	Knob	D25736-3	Volume - Blonde
	Knob	D25735-1	Contrast - Mahogany
	Knob	D25735-3	Contrast - Blonde
	Knob	D24699-4	Behind control door
	Safety Glass	E40488	

Note 1. In later Models M5 and M6 are replaced with C25963 (one unit).

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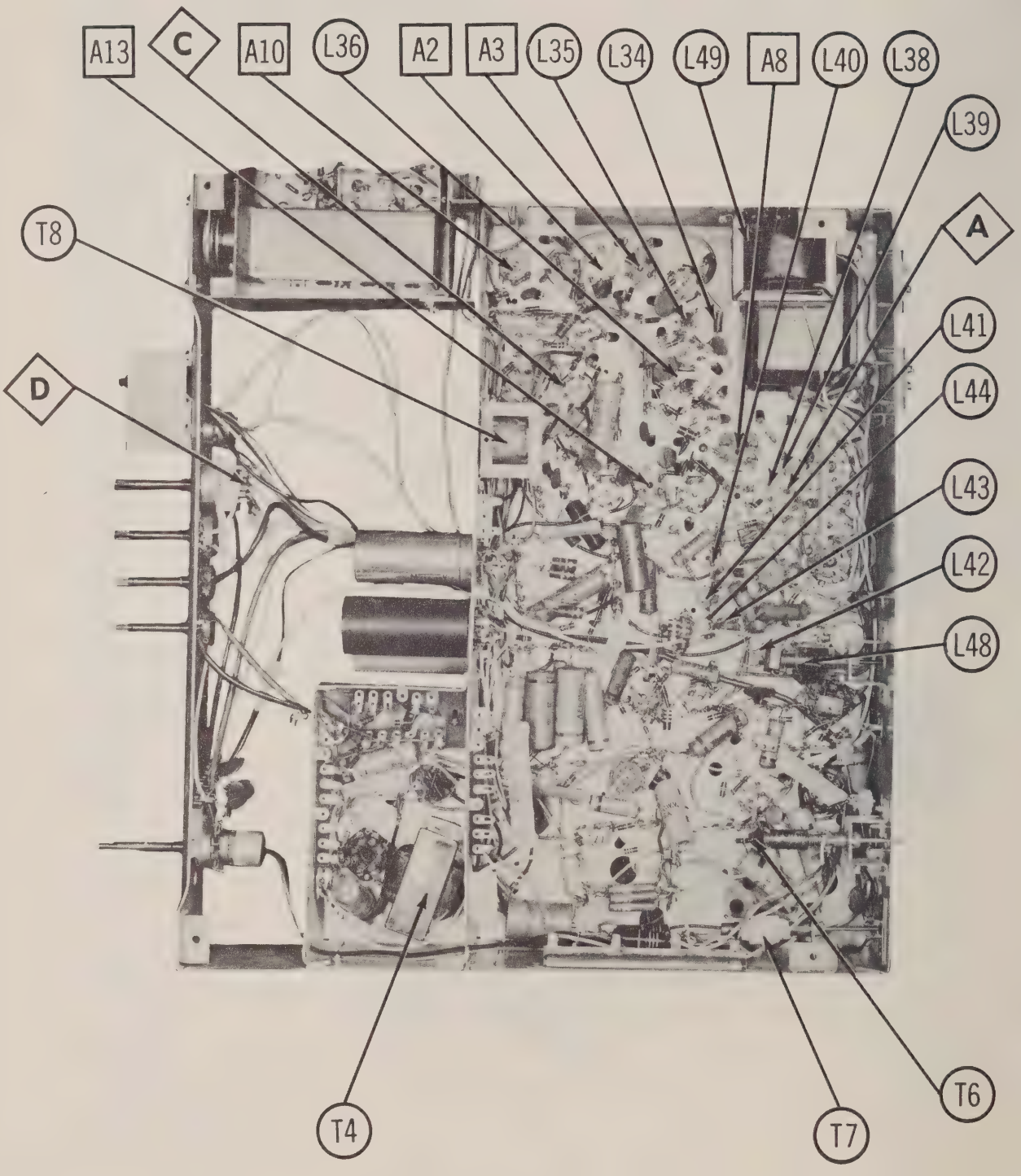
VHF TUNER-LEFT SIDE



CHASSIS BOTTOM VIEW-TRANS., INDUCTOR AND ALIGNMENT IDENTIFICATION

TROUBLE SHOOTING AIDS (cont)

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POWER

DEAD SET

If filaments fail to light, check AC interlock assembly, switch on volume control and T1. If filaments light check V26 and V27 by substitution. Check B+ filter and decoupling network components.

SMALL AND/OR DIM PIX

Check by substitution V26 and V27. Check B+ filter and decoupling network components for failure.

HIGH VOLTAGE

LOSS OF HIGH VOLTAGE

Check fuse M1. Check by substitution V22, V23. V24 and V25. Check waveform W18.

If Satisfactory	If Unsatisfactory
Check T3, T5A, R150, C134, C131, R144, R145, R146, R147 and other associated circuit components.	Check C126, C127, C128, C129, C130, R138, R141 and other associated components.

INSUFFICIENT HIGH VOLTAGE

Check by substitution V22, V23, V24, V25, V26 and V27. Proceed as outlined under "Loss of High Voltage". Check picture tube.

BLOOMING

Check V22, V23, V24 and V25. by substitution. Check R150, C134, C131, T3, T5A, picture tube and other associated circuit components

GENERAL

RASTER SOUND NO PIX

Follow procedure outlinder under "Loss of Video".

RASTER NO SOUND NO PIX (VHF)

Check V3, V4, V5, V6, V7 and V8 by substitution. Check video detector crystal and assembly. Check components associated with the video IF strip.

RASTER NO SOUND NO PIX (UHF)

Check V1, V2, V3, V4, V5, V6, V7, and V8. Check UHF-VHF switch. Follow procedure outlined under "Raster No Sound No Pix " (VHF) ".

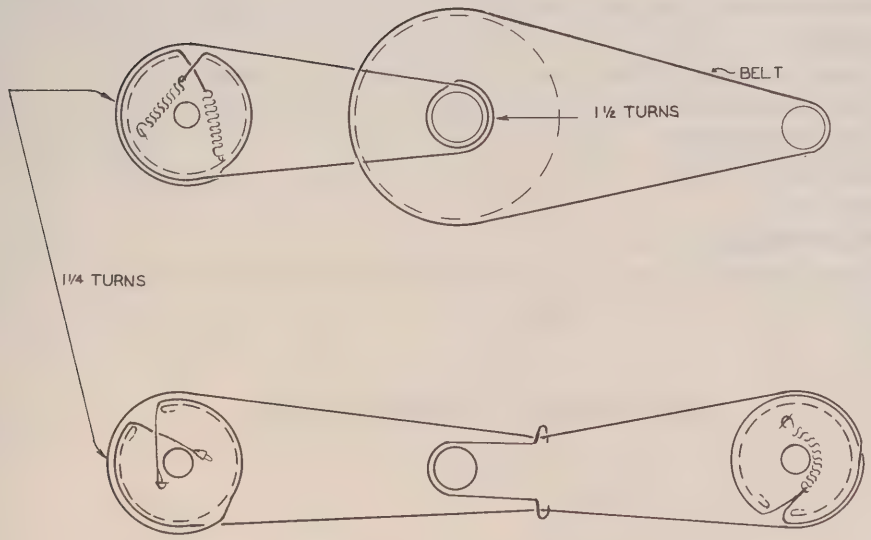
NO RASTER NO SOUND

See "Dead Set".

INTERMITTENT STREAKS

Check high voltage section for corona discharge and arcing.

Symptoms shown are assumed and are not indicative of the quality and workmanship of this equipment.



UHF DRIVE CORD STRINGING

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

Touch-up adjustments of the RF Tuner Oscillator Circuit may be accomplished by removing the Channel Selector and Fine Tuning knobs.

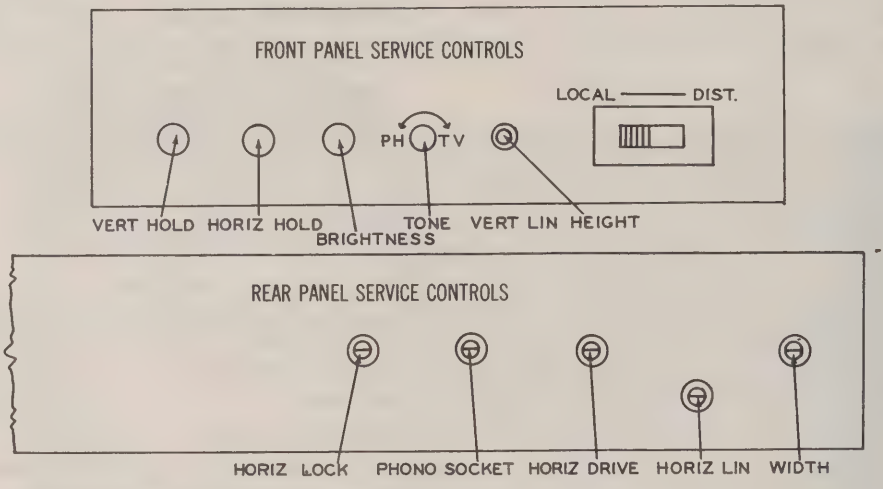
PICTURE TUBE SAFETY GLASS CLEANING

Remove six wood screws holding two strips (one on each side of safety glass). Remove the two strips and one at top. Remove safety glass.

PICTURE TUBE REMOVAL

For picture tube removal it is necessary to remove chassis. (See disassembly instructions).

SERVICE ADJUSTMENT LOCATION



HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

Adjustment of the horiz. osc. circuit can be made from the rear panel of the chassis. Set the Horiz. Hold Control at the Mid-position of its range and adjust the Horiz. Lock slug (L48) until the picture synchronizes horizontally.

SOUND IF DETECTOR BUZZ ADJUSTMENT

To eliminate Sound IF Detector Buzz, adjust the Ratio Detector Secondary (L47) located on top of chassis. (See tube placement chart).

FUSES

One fuse is used for Horiz. Sweep Circuit protection. (For location, see tube placement chart).

CENTERING

Centering is accomplished mechanically by means of a centering lever on the P. M. Focusing assembly. Adjust the centering lever from side to side, and up and down until the picture is properly centered.

BUILT-IN ANTENNA TUNING

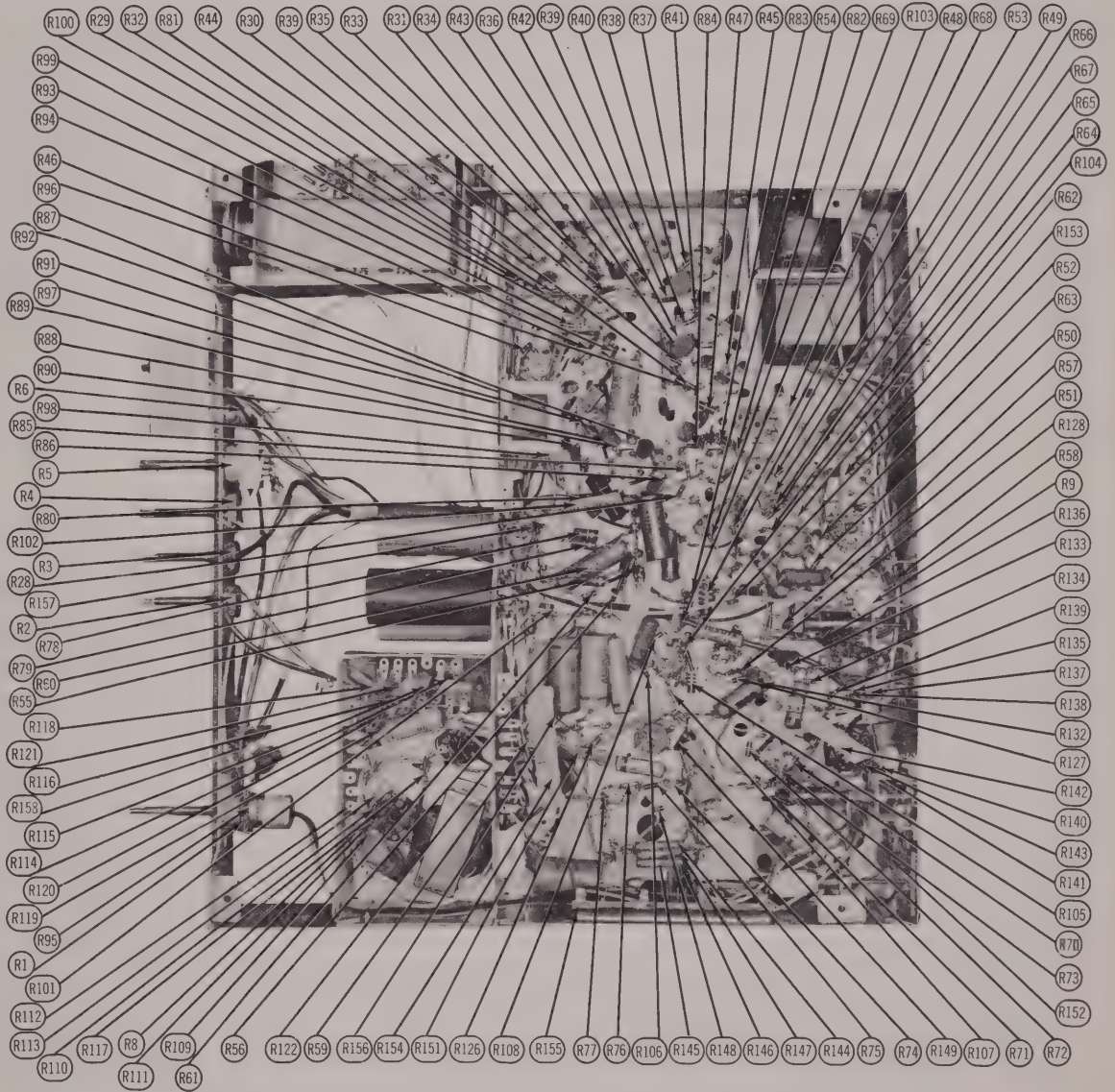
Built-in antenna can be adjusted from top rear of the cabinet. Adjust for a picture of maximum contrast and minimum ghost.

ANTI-PIN CUSHION ADJUSTMENT

Reduce the picture size so that the sides of the raster are visible, and position the magnets so that all sides are straight lines and the corners are at right angles.

DISASSEMBLY INSTRUCTIONS

1. Remove 8 push on type control knobs from front panel.
2. Disconnect built-in antenna.
3. Remove 6 wood and 1 metal screws. Remove rear cover.
4. Disconnect speaker, remove 1 metal screw and disconnect yoke plug, H. V, CRT.
5. Remove 6 chassis bolts. Remove chassis.
6. Remove 4 speaker nuts. Remove speaker.



CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION

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MODEL 27C31

CBS-COLUMBIA
MODEL 27C31 (Ch. 1027-1)

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CBS-COLUMBIA
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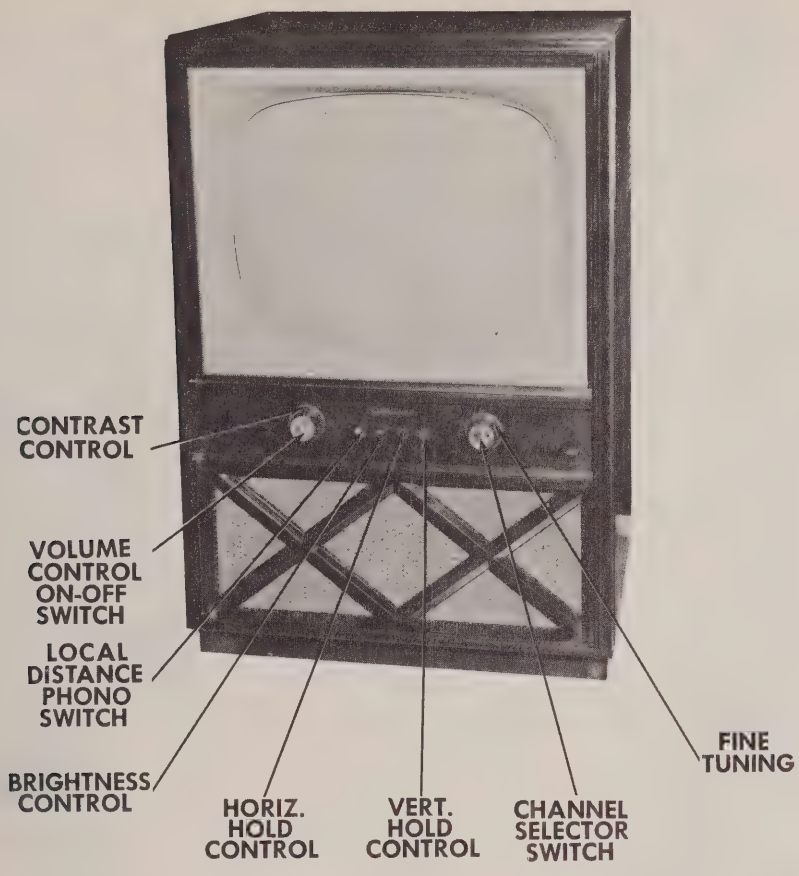

CBS-COLUMBIA
MODEL 27C31 (Ch. 1027-1)

TRADE NAME	CBS-Columbia Model 27C31
MANUFACTURER	CBS-Columbia, 170-53rd. St., Brooklyn 32, N.Y.
TYPE SET	Television Receiver
TUBES	Twenty-six
POWER SUPPLY	110-120 Volts AC-60-Cycle RATING 2.36 Amp. @ 117 Volts AC
TUNING RANGE—	Channels 2 thru 13, Video IF 25.75MC, Sound IF 21.25MC (Intercarrier)

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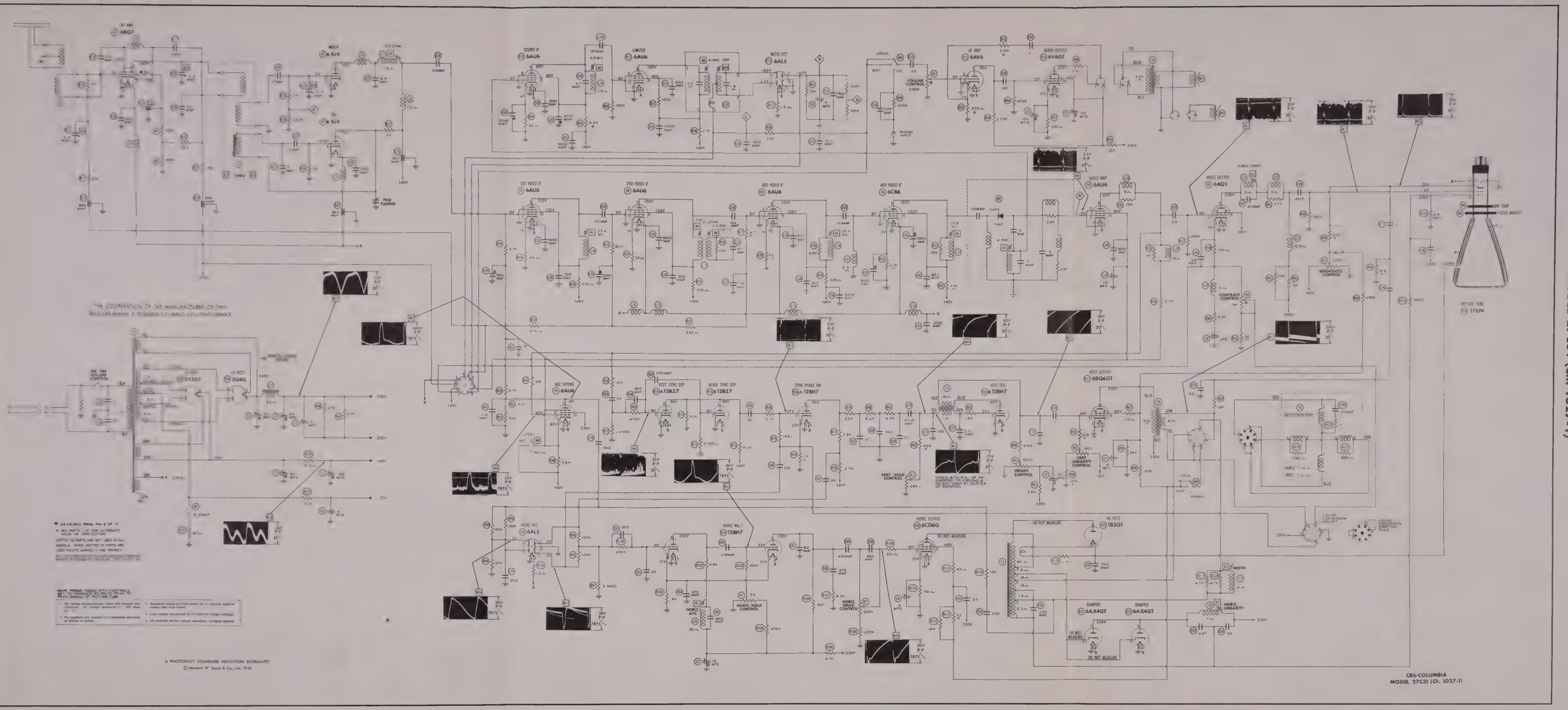
DATE 2-54 SET 231 FOLDER 4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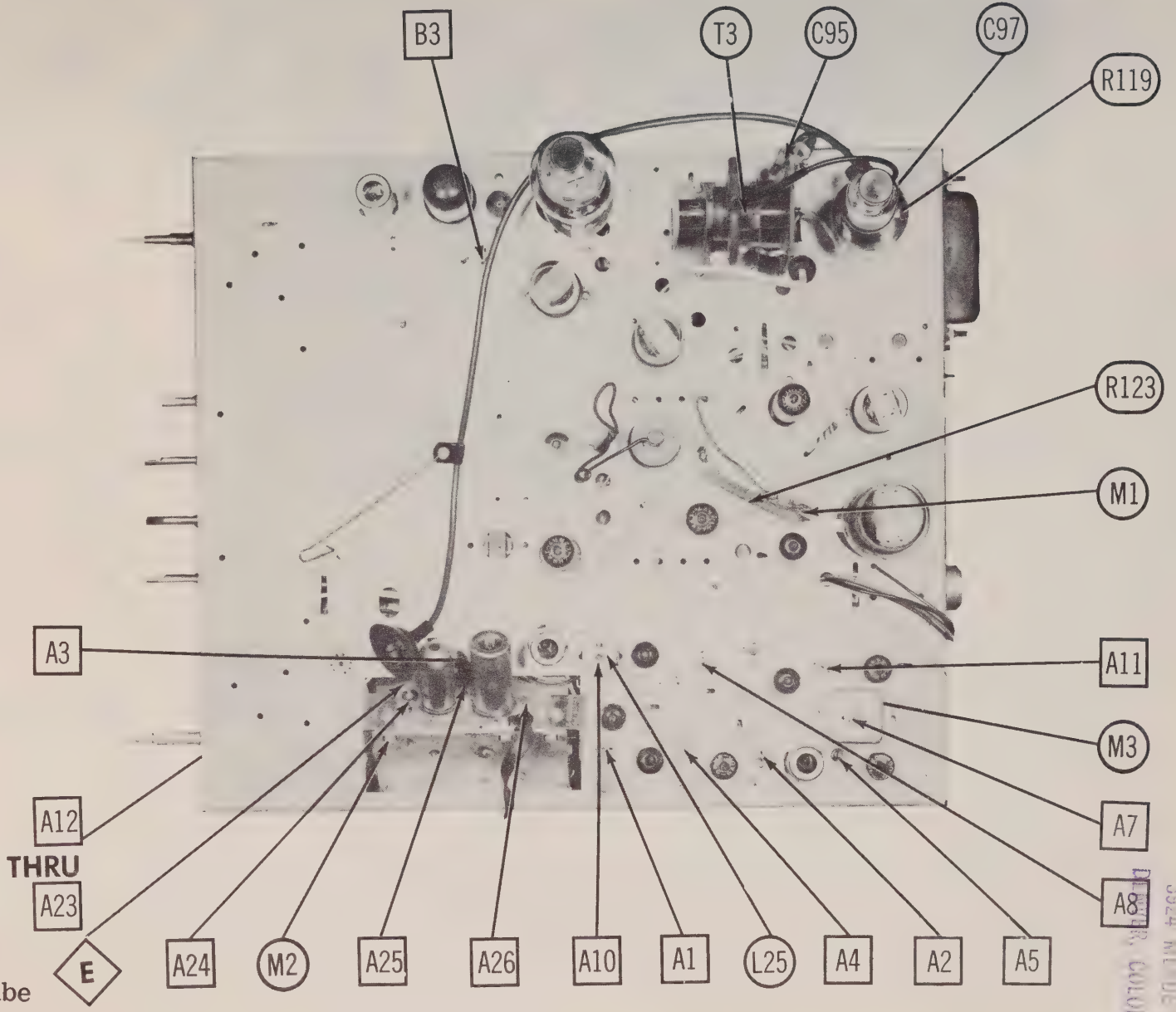


For tube location see tube placement chart page 5

CHASSIS TOP VIEW

MODEL 27C31 (Ch. 1027-1)

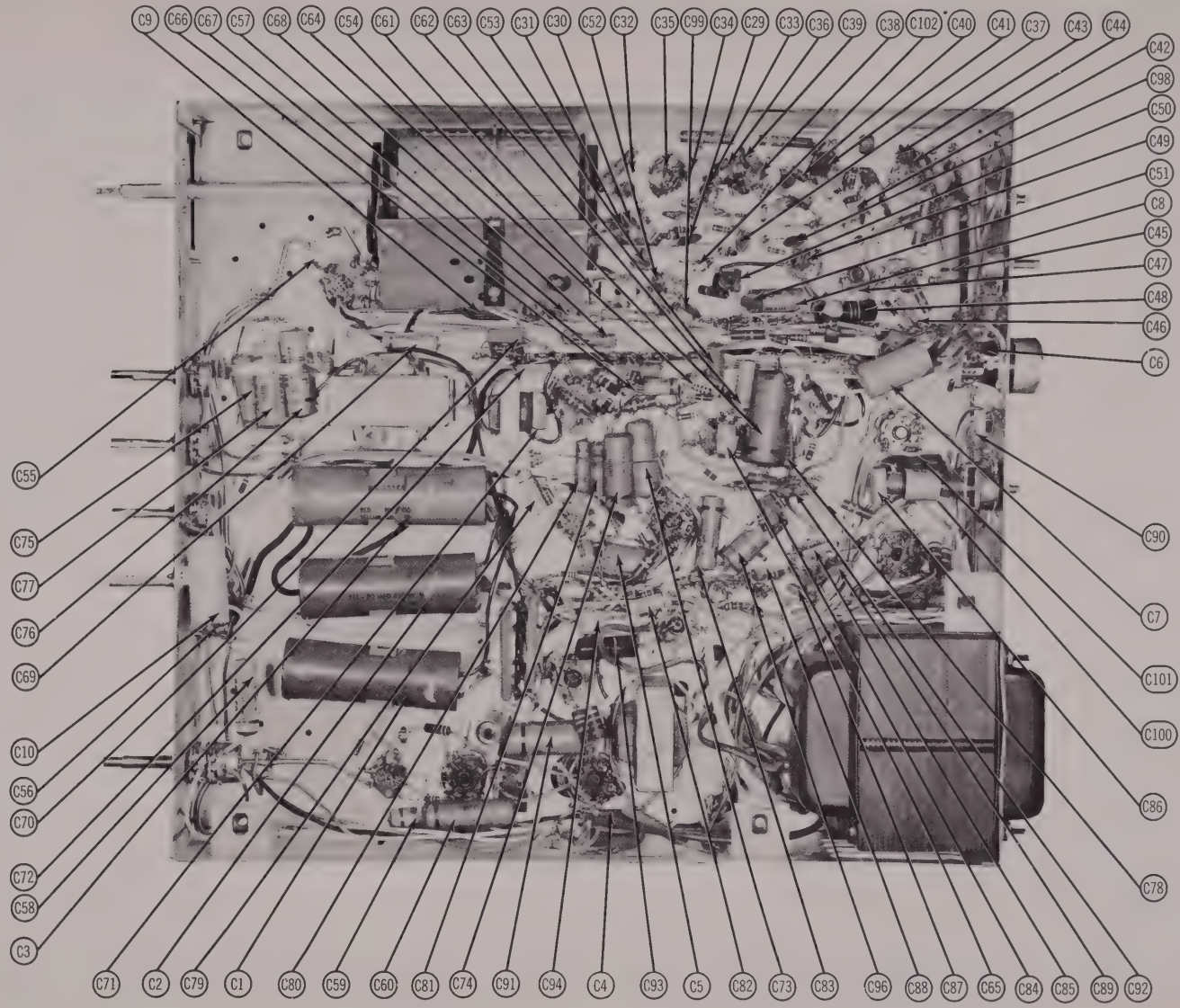
CBS-COLUMBIA

SET 231 FOLDER 4

PAGE 3

PROPERTY OF
L. F. SLAWENSHIP
3924 MILDE ST.
DENVER, COLORADO

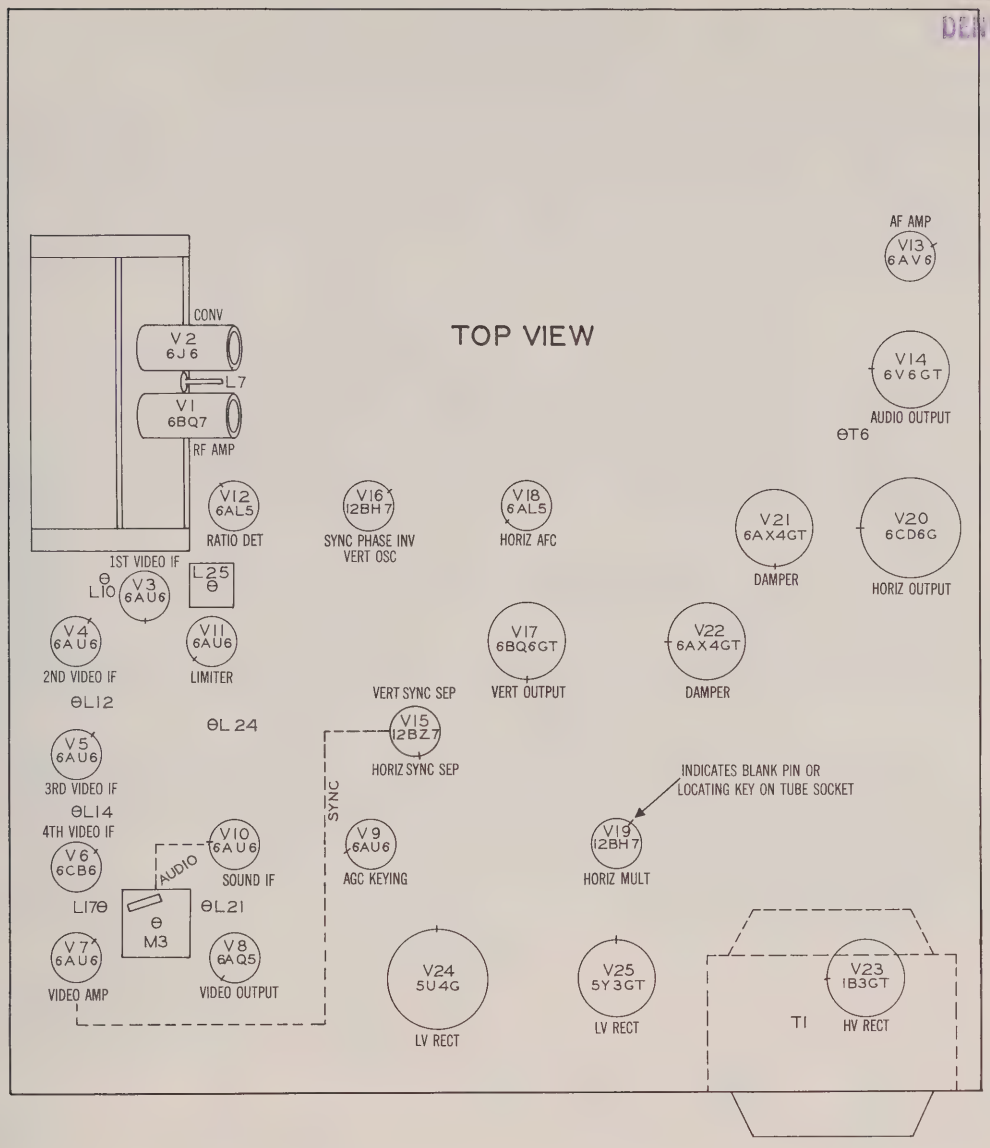
PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO



CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

TUBE PLACEMENT CHART



TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce the indicated symptoms. Refer to tube placement chart for location and type of tube.

POWER SUPPLY FAILURE
No raster, no sound - **V24, V25, Fuse (M1)**

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster - **V2, V3, V4, V5, V6**
No pic, no sound, has snow - **V1, V2, V3**
No pic, has sound, has raster - **V7, V8, V26**
Has pic, no sound - **V10, V11, V12, V13, V14**
Overloaded picture - **V9**

SYNC FAILURE
No vert. sync - **V16**
No horiz. sync - **V16, V18, V19**
No vert. or horiz. sync - **V15, V16**

SWEEP FAILURE
No raster, has sound - **V19, V20, V21, V22, V23, V26**
No vertical deflection - **V16, V17**
Poor vert. linearity or foldover - **V16, V17**
Poor horiz. linearity or foldover - **V19, V20, V21, V22**
Narrow picture - **V19, V20, V21, V22, V23, V24, V25**
Vert. off freq. - **V16**
Horiz. off freq. - **V16, V18, V19**

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

The high voltage shock hazard may be eliminated by removing the color plug from its socket on rear of chassis.

VIDEO IF ALIGNMENT

Remove the converter tube (V2) from its socket and replace with a 6J6 which has pin 1 removed. This will disable the local oscillator and reduce the possibility of erroneous indication.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
1.	Direct	High side to an ungrounded tube shield floating over dummy converter tube. Low side to chassis.	25.4MC (Unmod)	Any	DC probe to point (A). Common to chassis.	A1, A2	Adjust for maximum deflection. Attenuate generator to maintain 3 volts at VTVM.
2.	"	"	22.25MC	"	"	A3, A4	"
3.	"	"	23.6MC	"	"	A5	"
4.	"	"	21.25MC	"	"	A6	Adjust for MINIMUM deflection.

OVERALL VIDEO IF RESPONSE CHECK

Connect the negative lead of a 3 volt battery to the ungrounded side of C62. Connect the positive lead to chassis.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
5.	Direct	High side to an ungrounded tube shield floating over dummy converter tube. Low side to chassis.	24MC (10MC Swp)	21.25MC 25.75MC	Any	Vert. Amp. thru 10KΩ to point (A). Low side to chassis.		Check for response similar to Fig. 1. If necessary, retouch A1 thru A5 for desired response.

SOUND IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

Connect two matched 100KΩ (± 1%) resistors in series from point (B) to chassis. The junction of these two resistors is alignment point (D) as shown on the schematic.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
6.	.01MFD	High side to point (A). Low side to chassis.	4.5MC (Unmod)	Any	DC probe to point (B). Common to chassis.	A7, A8, A9	Adjust for maximum deflection.
7.	"	"	"	"	DC probe to point (C). Common to point (D).	A10	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.

SOUND IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60% modulation and 450KC sweep. Use 120% sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
6.	.01MFD	High side to point (A). Low side to chassis.	4.5MC (450KC Swp)	4.5MC	Any	Vert. Amp. to point (B). Low side to chassis.	A7, A8, A9	Disconnect stabilizer capacitor C9. Adjust for curve of maximum amplitude and symmetry as in Fig. 2.
7.	"	"	"	"	"	Vert. Amp. to point (C). Low side to chassis.	A10	Reconnect stabilizer capacitor C9. Adjust so that 4.5MC occurs at center of crossover lines as in Fig. 3. SLIGHTLY retouch A9 for maximum amplitude and straightness of crossover lines.

4.5MC TRAP ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
8.	.01MFD	High side to point (A). Low side to chassis.	4.5MC (Unmod.)	Any	Not used	A11	If A-11 is misadjusted a 4.5MC dot pattern will be visible on the picture screen. Adjust A-11 for MINIMUM dot pattern.

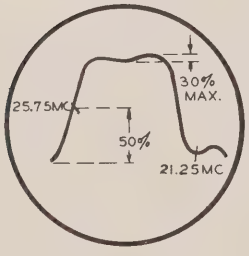


FIG.1

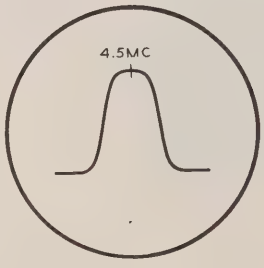


FIG.2

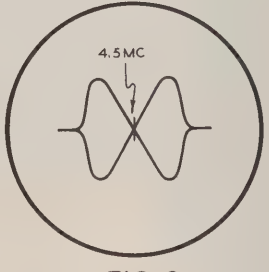


FIG. 3

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

ALIGNMENT INSTRUCTIONS (cont)

OSCILLATOR ALIGNMENT

Remove the dummy converter tube and replace the original 6J6 in its socket.
The channel oscillator adjustment screws are reached through a hole at the upper right of the channel switch shaft. The correct adjustment screw is accessible through this hole as the channel switch is turned to each channel.
Connect the bias battery as under video IF alignment.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50Ω.
Set the fine tuning control to the mid-position of its range.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
9.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	213MC (10MC Swp)	211.25MC 215.75MC	13	Vert. Amp. to point (A). Low side to chassis.	A12	Adjust to place sound marker in trap notch as in Fig. 4. Video marker should be at 50%.
			207MC (10MC Swp)	205.25MC 209.75MC	12		A13	
			201MC (10MC Swp)	199.25MC 203.75MC	11		A14	
			195MC (10MC Swp)	193.25MC 197.75MC	10		A15	
			189MC (10MC Swp)	187.25MC 191.75MC	9		A16	
			183MC (10MC Swp)	181.25MC 185.75MC	8		A17	
			177MC (10MC Swp)	175.25MC 179.75MC	7		A18	
			85MC (10MC Swp)	83.25MC 87.75MC	6		A19	
			79MC (10MC Swp)	77.25MC 81.75MC	5		A20	
			69MC (10MC Swp)	67.25MC 71.75MC	4		A21	
			63MC (10MC Swp)	61.25MC 65.75MC	3		A22	
			57MC (10MC Swp)	55.25MC 59.75MC	2		A23	

RF AND MIXER ALIGNMENT

Connect the bias battery as under video IF alignment.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50Ω.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
10.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	207MC (10MC Swp)	205.25MC 209.75MC	12	Vert. Amp. thru 10KΩ to point (E). Low side to chassis.	A24 A25 A26	Adjust for maximum response with band width similar to Fig. 5.
11.	"	"	213MC (10MC Swp)	211.25MC 215.75MC	13			Check for response similar to Fig. 5. If markers fall below 70% on any channel make slight compromise adjustments of A24, A25 and A26 with channel switch set to that channel, then recheck all other channels to see that they have not been seriously affected.
			201MC (10MC Swp)	199.25MC 203.75MC	11			
			195MC (10MC Swp)	193.25MC 197.75MC	10			
			189MC (10MC Swp)	187.25MC 191.75MC	9			
			183MC (10MC Swp)	181.25MC 185.75MC	8			
			177MC (10MC Swp)	175.25MC 179.75MC	7			
			85MC (10MC Swp)	83.25MC 87.75MC	6			
			79MC (10MC Swp)	77.25MC 81.75MC	5			
			69MC (10MC Swp)	67.25MC 71.75MC	4			
			63MC (10MC Swp)	61.25MC 65.75MC	3			
			57MC (10MC Swp)	55.25MC 59.75MC	2			

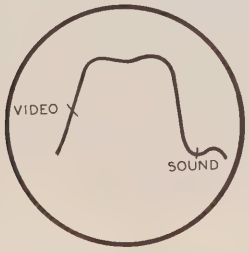


FIG. 4

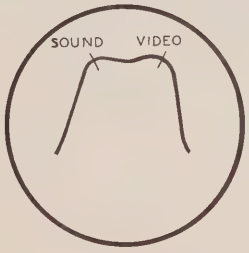
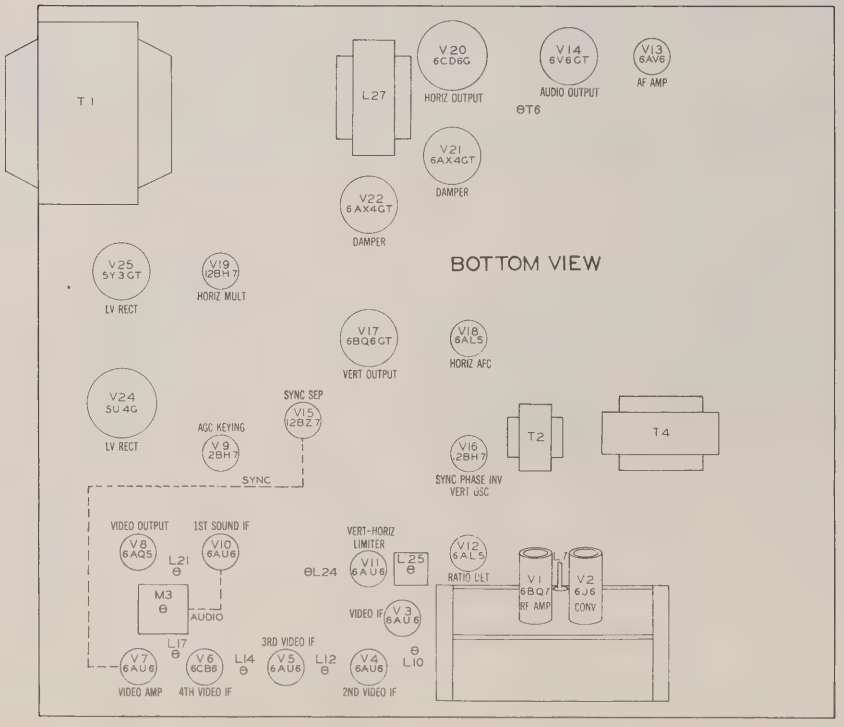


FIG. 5

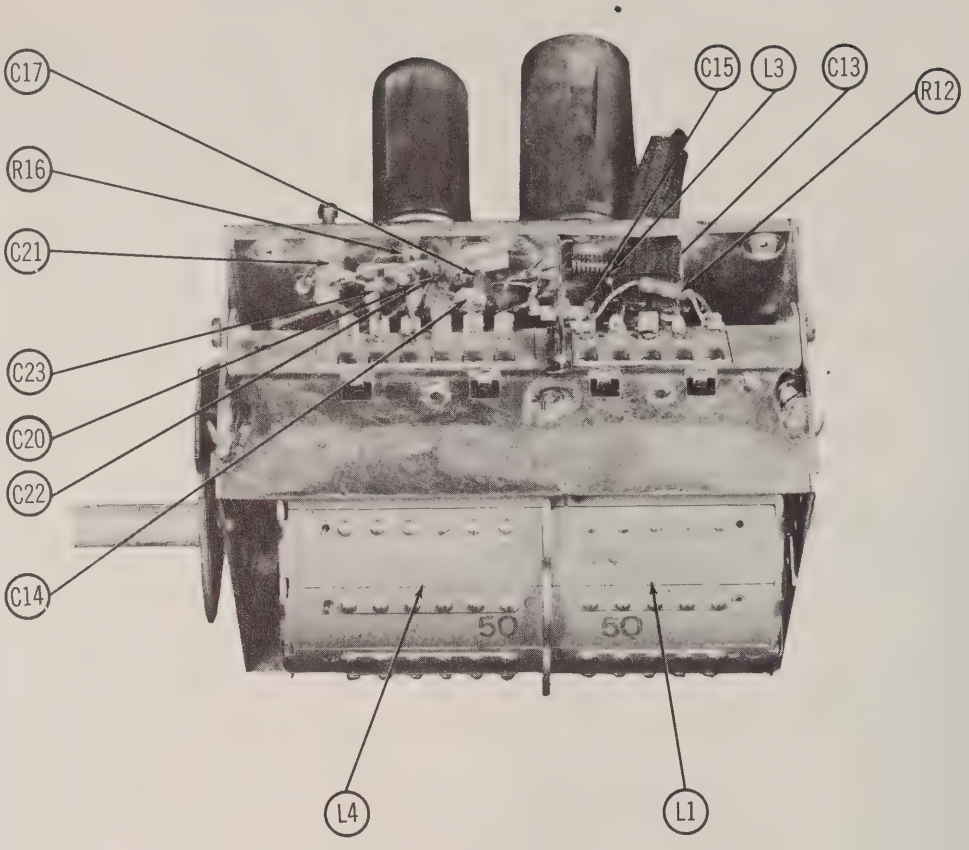
RESISTANCE MEASUREMENTS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6BQ7	INF	100KΩ	0Ω	.1Ω	0Ω	# 4KΩ	150KΩ	INF	0Ω
V 2	6J6	† 15KΩ	† 300Ω	.1Ω	0Ω	230KΩ	10KΩ	0Ω		
V 3	6AU6	63KΩ	0Ω	.1Ω	0Ω	† 630Ω	† 630Ω	82Ω		
V 4	6AU6	68KΩ	0Ω	.1Ω	0Ω	† 630Ω	† 630Ω	82Ω		
V 5	6AU6	62K	0Ω	.1Ω	0Ω	† 630Ω	† 630Ω	82Ω		
V 6	6CB6	2. 5Ω	220Ω	.1Ω	0Ω	† 630Ω	† 630Ω	0Ω		
V 7	6AU6	3. 9KΩ	0Ω	.1Ω	0Ω	† 8. 6KΩ	† 5. 9KΩ	0Ω		
V 8	6AQ5	470KΩ	3KΩ	0Ω	.1Ω	# 7. 3KΩ	† 300Ω	470KΩ		
V 9	6AU6	† 42KΩ	† 5. 9KΩ	0Ω	.1Ω	130KΩ	# 63Ω	† 5. 9KΩ		
V 10	6AU6	2Ω	0Ω	0Ω	.1Ω	† 8. 5KΩ	† 8. 5KΩ	82Ω		
V 11	6AU6	100KΩ	0Ω	.1Ω	0Ω	† 3KΩ	† 100KΩ	0Ω		
V 12	6AL5	INF	INF	1Ω	.1Ω	0Ω	0Ω	33KΩ		
V 13	6AV6	100KΩ	820Ω	0Ω	.1Ω	0Ω	0Ω	# 220KΩ		
V 14	6V6GT	INF	0Ω	# 1. 9KΩ	† 1. 5KΩ	470KΩ	10Meg	.1Ω	330Ω	
V 15	12BZ7	† 8. 5KΩ	2. 7Meg	0Ω	.1Ω	.1Ω	† 8. 5KΩ	2. 7Meg	0Ω	0Ω
V 16	12BH7	# 1. 6Meg	1. 4Meg	0Ω	.1Ω	.1Ω	† 6. 3KΩ	1Meg	2. 7KΩ	0Ω
V 17	6BQ6GT	15KΩ	.1Ω	50KΩ	50KΩ	700KΩ	230KΩ	0Ω	0Ω	TOP CAP # 993Ω
V 18	6AL5	3. 4Meg	3. 4Meg	1Ω	0Ω	27KΩ	0Ω	27KΩ		
V 19	12BH7	# 155KΩ	100KΩ	1. 8KΩ	.1Ω	.1Ω	# 11. 6KΩ	3. 8Meg	1. 8KΩ	0Ω
V 20	6CD6G	# 10KΩ	0Ω	180Ω	450KΩ	450KΩ	INF	.1Ω	# 10. 1KΩ	TOP CAP ▲ 9Ω
V 21	6AX4GT	INF	INF	5Meg	INF	# 65Ω	# 60Ω	.1Ω	0Ω	
V 22	6AX4GT	3. 9Meg	INF	5Meg	INF	# 65Ω	4. 9Meg	.1Ω	0Ω	
V 23	1B3GT	PINS 1-8 HAVE INF. RESISTANCE								TOP CAP ▲ 418Ω
V 24	5U4G	INF	40KΩ	INF	80Ω	INF	80Ω	INF	40KΩ	
V 25	5Y3GT	470KΩ	20KΩ	▲ 10Ω	73Ω	INF	73Ω	INF	20KΩ	
V 26	27EP4	0Ω	1Meg	PIN 10 ▲ 1Meg	PIN 11 260KΩ	PIN 12 .1Ω				

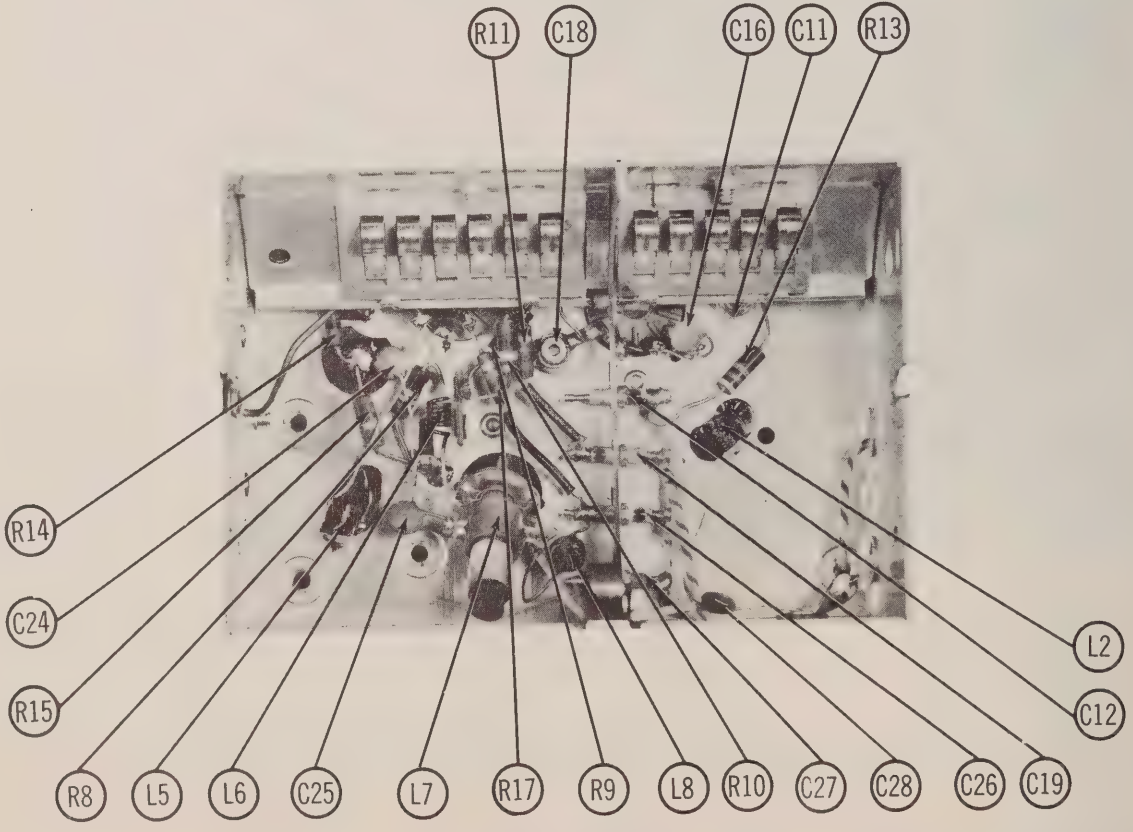
† MEASURED FROM PIN 8 OF V25.
# MEASURED FROM PIN 8 OF V24.
▲ MEASURED FROM PIN 3 OF V22.



TUBE PLACEMENT CHART

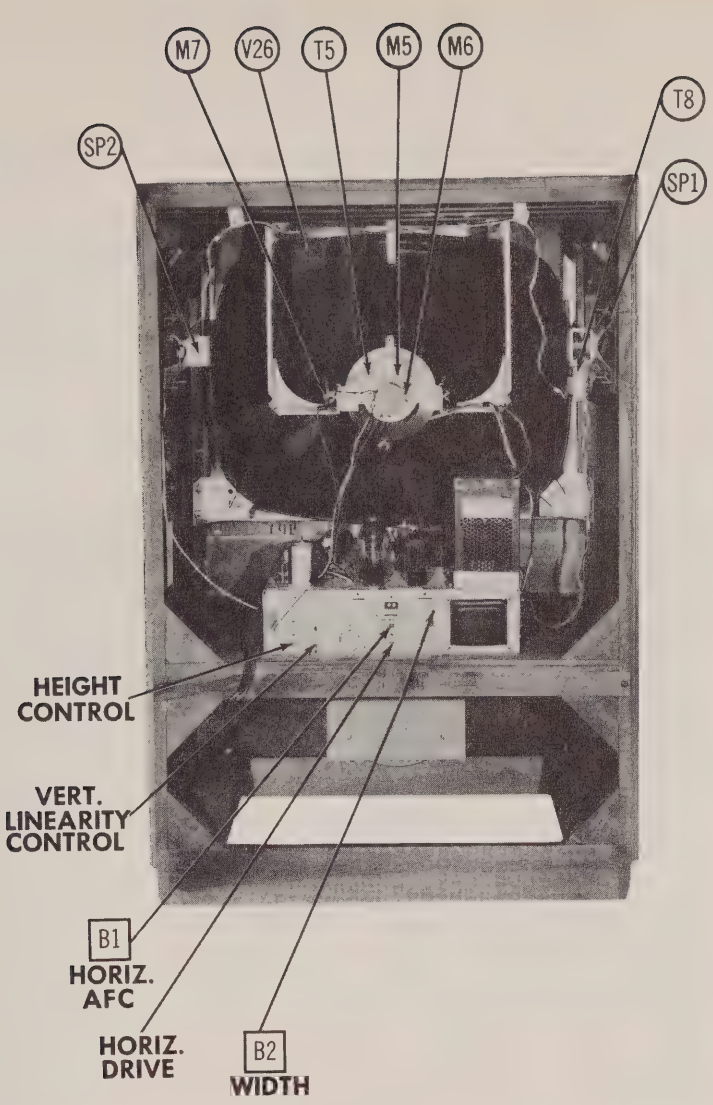


RF TUNER-RIGHT SIDE



RF TUNER-BOTTOM VIEW

PROPERTY OF
L. F. BLANKENSHIP
3024 MEADE ST.
DENVER, COLORADO



CABINET—REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Turn the set on and tune in a TV station, preferably a test pattern.

If horizontal hold control fails to maintain sync, set it in the middle of its range and adjust the horizontal AFC slug (B1) until the picture is in sync.

Check other channels and, if necessary, readjust B1 slightly for best sync on all channels.

Adjust the horizontal drive control clockwise as far as possible without the presence of a vertical white line or compression of the center of the picture.

Adjust the horizontal size slug (B2) for a picture slightly wider than necessary to fill the picture mask horizontally.

Adjust the horizontal linearity slug (B3) for a picture that is symmetrical from left to right.

If the anti-pincusion magnets require adjustment, the horizontal centering and horizontal size (B2) must be adjusted so that one edge of the caster is visible.

Adjust the proper magnet for straightest raster edge. Repeat procedure for opposite edge of raster. Return centering and horizontal size slug to normal settings.

TROUBLE SHOOTING AIDS

SWEEP

HORIZONTAL

LOSS OF SWEEP

Follow procedure outlined under "Loss Of High Voltage".

INSUFFICIENT SWEEP

Check by substitution V19, V20, V21, V22 and V24. Check adjustment of the horizontal drive control, B2 and B3. Check waveform W16.

If Satisfactory	If Unsatisfactory
Check C91, C93, C94, R112, R113, R117, R118, T3, T5A and other associated circuit components.	Check C85, C86, C87, C88, C89, C90, R104, R105, R108, R7 and other associated circuit components.

DRIVE LINES

Check by substitution V19, V20, V21 and V22. Check adjustment of horizontal drive control. Check C87, C89, C90, C93, C94, T3, T5A and other associated circuit components.

COMPRESSED LEFT SIDE

Check by substitution V20, V21 and V22. Check horizontal output and damper circuit components especially T3 and T5A.

FOLDS

Follow procedure outlined under "Drive Lines".

XMAS TREE EFFECT

Substitute V19. Check C85, C86, L26 and other associated circuit components.

VERTICAL

LOSS OF SWEEP

Check by substitution V16 and V17. Check waveform W10.

If Satisfactory	If Unsatisfactory
Check R87, R89, R90, T4, T5B and other associated circuit components.	Check C73, C74, R84, R85, R91 and other associated circuit components.

INSUFFICIENT SWEEP

Check adjustment of height and vertical linearity controls. Follow procedure outlined under "Loss Of Sweep".

COMPRESSED AT TOP

Check by substitution V16 and V17. Check T4, T5B and other associated circuit components for failure or change of value.

COMPRESSED AT BOTTOM

Check by substitution V16 and V17. Check components associated with these stages especially C73 and C74.

FOLDS

Check by substitution V16 and V17. Check C73 and C74. Check R85 and R86. Check other associated components.

SYNC

LOSS OF HORIZONTAL AND VERTICAL SYNC

Check by substitution V15 and V16. Check components associated with V15 and V16A.

LOSS OF HORIZONTAL SYNC - VERTICAL SYNC SATISFACTORY

Check by substitution V18 and V19. Check associated circuit components especially components associated with V19 for failure or change of value.

LOSS OF VERTICAL SYNC - HORIZONTAL SYNC SATISFACTORY

Check by substitution V15 and V16. Check waveform W8.

If Satisfactory	If Unsatisfactory
Check components associated with V16B.	Check components associated with V15 and V16A.

HORIZONTAL BENDING

Check by substitution V18, V19 and V20. Check the horizontal AFC filter network (R97, R100, C82 and C83) for failure or change of value.

VIDEO

LOSS OF VIDEO

Check by substitution V7 and V8. Check waveform W3.

If Satisfactory	If Unsatisfactory
Check picture tube and associated circuit components.	Check components associated with V7 and V8.

SOUND BARS (4.5 MC BEAT)

Check setting of fine tuning control. Check adjustment A11. Check video IF alignment.

POOR CONTRAST

Check by substitution V7 and V8. Check video detector crystal and assembly. Check picture tube and other associated circuit components.

NEGATIVE PIX

Check by substitution V7, V8 and V9. Check video detector crystal and assembly. Check picture tube and other associated circuit components.

SMEAR

Check by substitution V7 and V8. Check video detector crystal. Check C45, C48, R37, R45, R42, R43, R36, L18, L19, L22, L23, picture tube and other associated circuit components.

WIDE BLACK BAR ACROSS PIX

Check V1, V2, V3, V4, V5, V6, V7 and V8 for heater to cathode leakage.

AUDIO

WEAK OR NO SOUND

Check by substitution V10, V11, V12, V13 and V14. Check stages V13 and V14 using an audio signal generator. Apply audio signal across R4B.

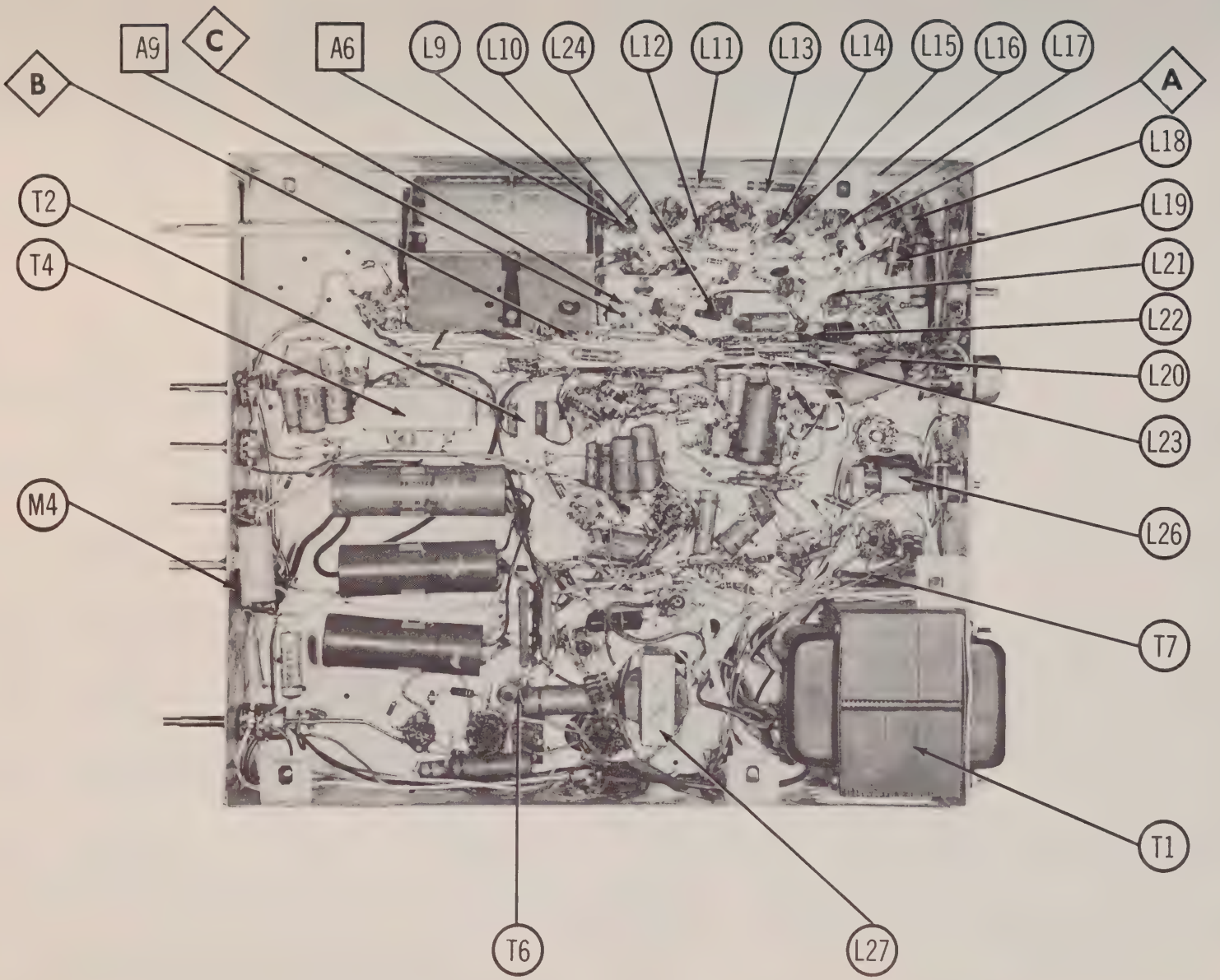
If Satisfactory	If Unsatisfactory
Check ratio detector and audio IF alignment and components.	Check components associated with V13 and V14.

BUZZ

Check fine tuning adjustment. Adjust A10 for minimum buzz. If buzz is still objectionable substitute V12 and realign audio IF and ratio detector. Check C9 and C57.

DISTORTED

Follow procedure outlined under "Weak Or No Sound".



CHASSIS BOTTOM VIEW-TRANS., INDUCTOR AND ALIGNMENT IDENTIFICATION

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

PROPERTY OF
L ANKENSHIP
MEADE ST.
DENVER, COLORADO

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA: CBS Columbia PART No.	STANDARD REPLACEMENT	RETMA BASE TYPE	NOTES
V1	RF Amplifier	6BQ7	6BQ7	9AJ	
V2	Converter	6J8	6J6	7BF	
V3	1st Video IF Amp.	6AU6	6AU6	7BK	
V4	2nd Video IF Amp.	6AU6	6AU6	7BK	
V5	3rd Video IF Amp.	6AU6	6AU6	7BK	
V6	4th Video IF Amp.	6CB6	6CB6	7CM	
V7	Video Amp.	6AU6	6AU6	7BK	
V8	Video Output	6AQ6	6AQ6	7BZ	
V9	AGC Keying	6AU6	6AU6	7BK	
V10	Sound IF Amp.	6AU6	6AU6	7BK	
V11	Limiter	6AU6	6AU6	7BK	
V12	Ratio Detector	6AL5	6AL5	6BT	
V13	A.F Amplifier	6AV6	6AV6	7BT	
V14	Audio Output	6V6GT	6V6GT	7B	
V15	Vert. Sync Sep. - Horiz. Sync Sep.	12BE7	12BE7	9A	
V16	Sync Phase Inv. - Vert. Oscillator	12BE7	12BE7	9A	
V17	Vert. Output	6BQ6GT	6AM	5BT	
V18	Horiz. AFC	6AL5	6AL5	6BT	
V19	Horiz. Mult.	12BE7	12BE7	9A	
V20	Horiz. Output	6CD6G	6CD6G	5BT	
V21	Damper	6AX4GT	6AX4GT	4CG	
V22	Damper	6AX4GT	6AX4GT	4CG	
V23	HV Rectifier	1B3GT	1B3GT	3C	
V24	LV Rectifier	5U4G	5U4G	5T	
V25	LV Rectifier	5Y3GT	5Y3GT	5T	

CATHODE-RAY TUBE

ITEM No.	REPLACEMENT DATA: CBS Columbia PART No.	SYLVANIA PART No.	GENERAL ELECTRIC PART No.	WESTINGHOUSE PART No.	RETMA BASE TYPE	NOTES
V26	27EP4	27EP4 27GP4 27RP4 ①	27EP4		12D 12D 12D	① Circuit changes necessary.

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	CBS Columbia PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C1A	80	250	A30173	AFH3-26		CO30			FP331.3	TVL-3642	Brown
B	120	250									Orange
C2A	20	450									Yellow
B	20	450	A30172	AFH3-36		CO27	FP376.5			TVL-3780	Red
C	20	450		PRS450/10		BR1045	TC72		TVA-1705		Blue
D	10	450									Green
C3A	80	450	A30169	AFH3-142		C109		FP-375		TVA-1716	Red
B	100	50								TVA-1310	Yellow
C4	4	50	A30149	PRS150/4		BR550		TC30		TVA-1303	
C5	10	250	A30145	PRS350/10		BR1025		TC52		TVA-1504	
C6	4	50	A30149	PRS150/4		BR550		TC30		TVA-1303	
C7	10	250	A30145	PRS350/10		BR1025		TC52		TVA-1504	
C8	1	50	A30138	ESE8T3		BRR-1-50T		TC31		TVA-1300	
C9	4	50	A30149	PRS150/4		BR550		TC30		TVA-1303	
C10	10	250	A30145	PRS350/10		BR1025		TC52		TVA-1504	
C11	3-9				829-10						
C12	800			EF-001	MFT-1000					503C-D1	
C13	3.5										
C14	47			BPD-000047	D5-470			GP1K-470	UC-5447	5GA-Q47	
C15	500			EF-001	MFT-1000					503C-D1	
C16	1000			BPD-001	DD-102	TM5D1	801-001	DC-521		5HK-D1	
C17	1.5							CT565A			
C18	5-3				829-3						
C19	800			EF-001	MFT-1000					503C-D1	
C20	47			BPD-000047	D5-470			GP1K-470	UC-5447	5GA-Q47	
C21	5				829-3				UC-5565A		
C22	10			SH10NP0	TCZ-10			NP0K-100	2T-541	5TCC-Q1	
C23	5			SH5N750				N750K-050		5TCUB-V47	
C24	1000			BPD-001	DD-102	TM5D1	801-001	DC-521		5HK-D1	
C25	6.8			S16.8NP0	TCZ-6.8			NP0K-6R8	2T-5568	5TCCB-V68	
C26	800			EF-001	MFT-1000					503C-D1	
C27	800			EF-001	MFT-1000					503C-D1	
C28	120			BPD-00012	D5-121	TM5T12		GP2K-121	UC-5312	5GA-T12	
C29A	5000		A19163	BPD-0047	DD2-502	TM5DD5	81L-005	DC-525		5HK-ED47	
B	5000						81L-005	DC-525			
C30	1500		A19149	BPD-0015	D5-152	TM5D15	801-0015	DC-5215		5HK-D15	
C31	5000			BPD-005	MD-502	TM5D5	81L-005	DC-525		5HK-D5	
C32	100		A556-1I8-2	SI100	D6-101	TM5T5	GP1K-101	UC-531		5GA-T1	
C33	30			1469-0001		5R5T1		MCB235		MS-31	
C34	1500		A19148	BPD-0015	DD-152	TM5D15	801-0015	DC-5215		5HK-D15	
C35	5000		A19109	BPD-005	DD-502	TM5D5	81L-005	DC-525		5HK-D5	
C36	100		A556-1I8-2	SI100	D6-101	TM5T5	GP1K-101	UC-531		5GA-T1	
C37	5000		A19109	BPD-005	MD-502	TM5D5	81L-005	DC-525		5HK-D5	
C38	1500		A19148	BPD-0015	D5-152	TM5D15	801-0015	DC-5215		5HK-D15	
C39	5000		A19109	BPD-005	DD-502	TM5D5	81L-005	DC-525		5HK-D5	
C40	100		A556-1I8-2	SI100	D6-101		GP1K-101	UC-531		5GA-T1	
C41A	5000		A19163	BPD-0047	DD2-502	TM5DD5	81L-005	DC-525		5HK-ED47	
B	5000						81L-005	DC-525			
C42	680	500	A190-143	1464-00075						MS-37	
C43	5000		A19109	BPD-005	DD-502	TM5D5	81L-005	DC-525		5HK-D5	
C44	5000		A19109	BPD-005	DD-502	TM5D5	81L-005	DC-525		5HK-D5	
C45	.05	600	A194-160	P688-05	DF-503	PTE5S5		PTE15		6TM-S5	
C46	120	500	A190-125	1469-001		5R5T1		MCB235		MS-31	
C47	47	500	A555-133	1469-00005		5R5Q5		MCB225		MS-45	
C48	.047	600	A187-160	P688-047	DF-503	PTE5S47		PTE147		6TM-S47	
C49A	5000		A19163	BPD-0047	DD2-502	TM5DD5	81L-005	DC-525		5HK-ED47	
B	5000						81L-005	DC-525			
C50	47	500		1469-00005		5R5Q5		MC B225		MS-45	
C51	5000		A19109	BPD-005	DD-502	TM5D5	81L-005	DC-525		5HK-D5	

CAPACITORS (cont)

ITEM No.	RATING: CAP.	RATING: VOLT	CBS Columbia PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C52	5000		A19109	BPD-005	DD-502	TM5D5	81L-005	DC-525	5HK-D5	
C53	5000		A19109	BPD-005	DD-502	TM5D5	81L-005	DC-525	5HK-D5	
C54	.000		A555-136-2							
C55	510		A556-238							
C56	220	500	A55-123	1479-00025		ER5T25		MCB237	MS-32	
C57	1500		A19148	BPD-0015	DD-152	TM5D15	801-0015	DC-5215	5HK-D15	
C58	.05	600	A194-160	P688-05	DF-503	PTE5S5		PTE15	6TM-S5	
C59	.05	600	A194-160	P688-05	DF-503	PTE5S5		PTE15	6TM-S5	
C60	.1	600	A19316	P688-1	DF-104	PTE5P1		PTE101	6TM-P1	
C61	1.0	100	A194-21					PT41	2TM-M1	
C62	.01	600	A194-155	P688-01	D6-103	PTE5S1	GP2-333-103	PT61	6TM-S1	
C63	.01	600	A194-156	P688-03	DF-303	PTE5S3		PT613	6TM-S3	
C64	390	500	A190-137	1479-0004		5R5T4		MCB243	MS-34	
C65	270	500	A190-133	1479-0003		5R5T3		MCB241	MS-33	
C66	.01	600	A194-155	P688-01	D6-103	PTE5S1	GP2-332-103	PT61	6TM-S1	
C67	.005	600	A194-151	P688-005	D6-502	PTE5D5	GP2-333-502	PT625	6TM-D5	
C68	.005	600	A194-151	P688-005	D6-502	PTE5D5	GP2-333-502	PT625	6TM-D5	
C69	.1	600	A194-15 5	P688-01	D6-103	PTE5S1	GP2-333-103	PT611	6TM-S1	
C70	4700	500	A192-163	1464-005		1DR5D5		MCB465	MS-35	
C71	.001	600	A197-145	P688-001	D6-102	PTE5D1	GP2K-102	PT621	6TM-D1	
C72	510	500	A190-140	1479-0005		5R5T5		MCB245	MS-35	
C73	.1	600	A194-162	P688-1	DF-104	PTE5P1		PT601	6TM-P1	
C74	.1	600	A194-162	P688-1	DF-104	PTE5P1		PT601	6TM-P1	
C75	.02	600	A194-156	P688-03	DF-303	PTE5S3		PT613	6TM-S3	
C76	.1	500	A194-163	P688-1	DF-104	PTE5P1		PT601	6TM-P1	
C77	.1	600	A194-162	P688-1	DF-104	PTE5P1		PT601	6TM-P1	
C78	.002	600	A194-146	P688-002	D6-202	PTE5D2	GP2L-202	PT622	6TM-D2	
C79	.002	600	A194-146	P688-002	D6-202	PTE5D2	GP2L-202	PT622	6TM-D2	
C80	.001	600	A194-145	P688-001	D6-102	PTE5D1	GP2L-102	PT621	6TM-D1	
C81	.001	600	A194-145	P688-001	D6-102	PTE5D1	GP2L-102	PT621	6TM-D1	
C82	.005	600	A197-151	P688-005	D6-502	PTE5D5	GP2-333-502	PT625	6TM-D5	
C83	.05	600	A194-160	P688-05	DF-503	PTE5S5		PT615	6TM-S5	
C84	470	500	A190-139	1479-0005		5R5T5		MCB245	MS-35	
C85	470	500	A190-139	1479-0005		5R5T5		MCB245	MS-35	
C86	2900	500	A195-261	1464-004		1DR5D4		MCB463	MS-34	
C87	82	500	A190-121							
C88	270	500	A190-133	1479-0003		5R5T3		MCB241	MS-33	
C89	470	500	A190-139	1479-0005		5R5T5		MCB245	MS-35	
C90	680	500	A190-143	1479-0007		5R5T7			MS-37	
C91	.25	400	A197-115	P489-25		PTE4P25		PT4025	4TM-P25	
C92	.002	1000	A197-194	P1068-002		PTE1H22		PT1622	MB-22	
C93	.047	500	A197-160	P688-047		PTE5S47		PT6147	6TM-S47	
C94	.05	600	A197-160	P688-05		PTE5S5		PT615	6TM-S5	
C95	330	3500	A191-36							
C96	.1	500	A194-162	P688-1	DF-104	PTE5P1		PT601	6TM-P1	
C97	500	30KV	A19175-4		TV8-503					
C98	5000		A19109	BPD-005	MD-502	TM5D5	81L-005	DC-525	5HK-D5	
C99	5000		A19109	BPD-005	MD-502	TM5D5	81L-005	DC-525	5HK-D5	
C100	.01	600		689ZX-01		PZ681		PT611	6TM-S1	
C101	.01	600		689ZX-01		PZ681		PT611	6TM-S1	
C102	47		A555-113-2	S147NP0	TCZ-47		NP0K-470	2T-5447	5TCC-Q47	
C103	120	2000								

CONTROLS

ITEM No	RATING: RESISTANCE	RATING: WATTS	CBS Columbia PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	2Meg	½	PA-24146	QU-139	AG-83-S	B-75	U-56	Vert. Hold
B	Shaft		Not Req.	Not Req.	FS-3	Not Req.	Not Req.	Attach to R2A
R2A	5000Ω	½	PA-24137	QU-114	AG-19-S	B-10	U-14	Horiz. Hold
B	Shaft		Not Req.	Not Req.	FS-3	Not Req.	Not Req.	Attach to R2A
R3A	100KΩ	½	PA-24134	QU-128	AG-49-S	B-40	U-41	Brightness
B	Shaft		Not Req.	Not Req.	FS-3	Not Req.	Not Req.	Attach to R3A
R4A	5000Ω	½	PA-24136	* QJ423	RTV-393		UF53R	Contrast (panel)
B	250KΩ	½	Not Req.				UR254A †	Volume (rear)
C	Switch		Not Req.				US-26	Attach to R4B
R5A	5Meg	½	PA-241I-D	QU-141	AG-85-S	AB-87	SU-67	Height
B	Shaft		Not Req.	Not Req.	FKS-1/4	AK-1	Not Req.	Attach to R5A
R6A	1Meg	½	PA-24112-C	QU-137	AG-61-S	AB-69	SU-54	Vert. Linearity
B	Shaft		Not Req.	Not Req.	RS-3	AK-1	Not Req.	Attach to R6A
R7A	250KΩ	½	PA-24138	QU-130	AG-55-S	AB-50	SU-46	Horiz. Drive
B	Shaft		Not Req.	Not Req.	FKS-1/4	AK-1	Not Req.	Attach to R7A

† Universal replacement (Mallory exact duplicate Part No. UE508S).
* CONCENTRIKIT EQUIVALENT KIT K-2 BASE ELEMENTS & SHAFTS B17-114 & P1-118 (Panel) B13-130 & RI-205 (Rear) & SWITCH 76-1.

RESISTORS

ITEM No.	RATING: OHMS	RATING: WATT	CBS Columbia PART No.	IRC PART No.	NOTES
R8	160Ω	½		BTS-160K	
R9	100KΩ	½		BTS-100K	
R10	100KΩ	5%		BTS-100K 5%	
R11	150Ω	½		BTS-150Ω	
R12	15KΩ	½		BTS-15K	
R13	47KΩ	½		BTS-47K	
R14	10KΩ	½		BTS-10K	
R15	220KΩ	½		BTS-220K	
R16	10KΩ	½		BTS-10K	
R17	15KΩ	½		BTS-15K	
R18	4700Ω	½	A231-1165	BTS-4700	
R19	82Ω	½	A231-1123	BTS-82	
R20	330Ω	½	A231-1137	BTS-330	
R21	330Ω	½	A231-1137	BTS-330	
R22	330Ω	½	A231-1137	BTS-330	
R23	8200Ω	½	A231-1171	BTS-8200	
R24	82Ω	½	A231-1123	BTS-82	
R25	330Ω	½	A231-1137	BTS-330	
R26	15KΩ	½	A231-1177	BTS-15K	
R27	4700Ω	½	A231-1165	BTS-4700	

RESISTORS (cont)

ITEM No.	RATING: OHMS	RATING: WATT	CBS Columbia PART No.	IRC PART No.	NOTES
R28	82Ω	½	A231-1123	BTS-82	
R29	330Ω	½	A231-1137	BTS-330	
R30	6800Ω	½	A231-1169	BTS-6800	
R31	220Ω	½	A231-1133	BTS-220	
R32	330Ω	½	A231-1137	BTS-330	
R33	10KΩ	½	A231-1173	BTS-10K	
R34	10KΩ	½	A231-1173	BTS-10K	
R35	1000Ω	½	A231-1149	BTS-1000	
R36	2700Ω	2	A233-1169	BTB-2700	
R37	470KΩ	½	A231-1213	BTS-470K	
R38	270Ω	1	A232-1135	BTA-270	
R39	120Ω	½	A231-1127	BTS-120	
R40	3300Ω	½	A231-1161	BTS-3300	
R41	4700Ω	2	A233-1165	BTB-4700	
R42	6800Ω	2		BTB-6800	
R43	10KΩ	2		BTB-10K	
R44	220KΩ	1	A231-1205	BTS-220K	
R45	1Meg	1	A231-1221	BTS-1Meg	
R46	4700Ω	2	A233-1165	BTB-4700	
R47	4700Ω	2	A233-1165	BTB-4700	

RESISTORS (cont)

ITEM No.	RATING: OHMS	RATING: WATT	CBS Columbia PART No.	IRC PART No.	NOTES
R48	560Ω	1	A232-1167	BTA-5600	
R49	33KΩ	½	A231-1185	BTS-33K	
R50	12KΩ	½	A231-1175	BTS-12K	
R51	82KΩ	½	A231-1195	BTS-82K	
R52	56KΩ	½	A231-1189	BTS-56K	
R53	2700Ω	½	A231-1159	BTS-2700	
R54	82Ω	½	A231-1123	BTS-82	
R55	8200Ω	1	A232-1171	BTS-8200	Note 1
R56	100KΩ	½	A231-1197	BTS-100K	
R57	100KΩ	½	A231-1197	BTS-100K	
R58	2700Ω	½	A231-1159	BTS-2700	
R59	39KΩ	½	A231-1187	BTS-39K	
R60	560KΩ	½	A231-1215	BTS-560K	
R61	33KΩ	½	A231-1185	BTS-33K	
R62	8200Ω	2		BTS-820	Note 2
R63	5600Ω	½		BTS-5600	Note 3
R64	220KΩ	½	A231-1205	BTS-220K	
R65	1500Ω	10	A2134-12		
R66	470KΩ	½	A231-1213	BTS-470K	
R67	330Ω	1	A232-1137	BTA-330	
R68	47Ω	½	A231-1117	BTS-47	
R69	470KΩ	½	A231-1213	BTS-470K	
R70	2.2Meg	½	A231-1229	BTS-2.2Meg	
R71	2.7Meg	½	A231-1231	BTS-2.7Meg	
R72	22KΩ	½	A231-1181	BTS-22K	
R73	8200Ω	½	A231-1171	BTS-8200	
R74	2700Ω	1	A232-1159	BTA-2700	
R75	1Meg	½	A231-1221	BTS-1Meg	
R76	22KΩ	½	A231-1181	BTS-22K	
R77	3300Ω	1	A232-1161	BTA-3300	
R78	2700Ω	1	A232-1159	BTA-2700	
R79	22KΩ	½	A231-1181	BTS-22K	
R80	8200Ω	½	A231-1171	BTS-8200	
R81	82000Ω	½	A231-1171	BTS-8200	
R82	820KΩ	½	A232-1219	BTS-820K	
R83	15KΩ	½		BTS-15K	
R84	470KΩ	½	A231-1213	BTS-470K	
R85	470KΩ	½	A231-1213	BTS-470K	
R86	470KΩ	½	A231-1213	BTS-470K	
R87	120Ω	½		BTS-120	

ITEM No.	RATING: OHMS	RATING: WATT	CBS Columbia PART No.	IRC PART No.	NOTES
R88	470KΩ	½	A231-1213	BTS-470K	
R89	56KΩ	½		BTS-56K	
R90	150KΩ	1	A232-1201	BTA-150K	
R91	33KΩ	½	A231-1185	BTS-33K	
R92	12KΩ	½	A231-1175	BTS-12K	
R93	8200Ω	½	A231-1171	BTS-8200	
R94	27KΩ	½	A231-1183	BTS-27K	
R95	100KΩ	½	A231-1197	BTS-100K	
R96	100KΩ	½	A231-1197	BTS-100K	
R97	3.3Meg	½	A231-1233	BTS-3.3Meg	
R98	150KΩ	1	A232-1201	BTA-150K	
R99	150KΩ	1	A232-1201	BTA-150K	
R100	470KΩ	½	A231-1213	BTS-470K	
R101	1800Ω	½	A231-1155	BTS-1800	
R102	6800Ω	½	A231-1169	BTS-6800	
R103	100KΩ	½	A231-1197	BTS-100K	
R104	150KΩ	½	A231-1201	BTS-150K	
R105	470KΩ	½	A231-1213	BTS-470K	
R106	4700Ω	½	A231-1165	BTS-4700	
R107	8200Ω	½	A231-1171	BTS-8200	
R108	220KΩ	½	A231-1205	BTS-220K	
R109	82Ω	½	A231-1123	BTS-82	
R110	180Ω	5	A2134-19		
R111	82Ω	½	A231-1123	BTS-82	
R112	18KΩ	2	A233-1179	BTB-18K	
R113	22KΩ	2	A233-1181	BTB-22K	
R114	10KΩ	½	A232-1173	BTA-10K	
R115	1Meg	½	A231-1221	BTS-1Meg	
R116	3.9Meg	½	A231-1235	BTS-3.9Meg	
R117	4700Ω	2	A233-1165	BTB-4700	
R118	4700Ω	2	A233-1165	BTB-4700	
R119	2.4Ω	2	A2362		
R120	560Ω	½		BTS-560	
R121	560Ω	½		BTS-560	
R122	1000Ω	½		BTS-1000	
R123	60Ω	15	A2134-17		
R124	150KΩ	½	A231-1201	BTS-150K	
R125	300Ω	7	A2134-11		
R126	1.2Ω	1	A2315I		
R127	1.2Ω	1	A2315I		

Note 1. Some models may use a 18000 resistor in this application.
Note 2. Some models may use a 3300 resistor in this application.
Note 3. Some models may use a 15KΩ resistor in this application.

TRANSFORMER (POWER)

ITEM No.	RATING: PRI.	RATING: SEC. 1	RATING: SEC. 2	RATING: SEC. 3	CBS Columbia PART No.	STANCOR PART No.	MERIT PART No.	Halldorson PART No.	TRIAD PART No.	RCA TYPE No.
T1	117VAC @2.36A	680VCT .330ADC tap ③ 430VCT .090ADC	5VAC ④ 3A	5VAC ②2A SEC. 4 6.3VAC ⑤3A	PC-10151					

TRANSFORMER (SWEEP CIRCUITS)

ITEM No.	RATING: DC RESISTANCE PRI.	RATING: DC RESISTANCE SEC.	CBS Columbia PART No.	STANCOR PART No.	MERIT PART No.	Halldorson PART No.	TRIAD PART No.	RCA TYPE No.	NOTES
T2	176Ω	1000Ω	PB10106-2	A-8125	A-3006●	B6702	A-97X	209T1 ①	Vert.Osc. Trans.
T3	433.3Ω tap ④ 2.3Ω, 3.7Ω, 15.7Ω, 15.3Ω 23.3Ω	0Ω	PC10155					235T1	Horiz.Output Trans.
T4	930Ω	6Ω	PC10154-1	A-8115 ②	A-3088	Z1B02	A-107X ③		Vert.Output Trans.
T5A	14Ω		PC10115-6 ①		MDF-90			219D1 ⑤	Horiz.Deflection Coils
B	41Ω		PC28326						Vert.Deflection Coils
T6	5Ω		PB28327		MWC-6④		WC-12 ⑤	21HR1	Horiz.Lin. Coil
T7	2Ω		PB28318	WC-3⑤	MWC-3 ④		WC-12 ⑤	20HR1	Width Coil

① Alternate vertical output transformers
② Drill new mounting holes.
③ Drill one new mounting hole.
④ Enlarge mounting hole.
⑤ Connect to coded blue and green terminals.
⑥ Do not use tap.
⑦ Connect to coded green and red terminals.
⑧ Use original deflection coil network.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	RATING: IMPEDANCE PRI.	RATING: IMPEDANCE SEC.	RATING: DC RES. PRI.	RATING: DC RES. SEC.	CBS Columbia PART No.	STANCOR PART No.	MERIT PART No.	Halldorson PART No.	TRIAD PART No.	NOTES
T8	5.6KΩ	1.8Ω	320Ω	.56Ω		A-3849 ①	A-2930	Z1L09	S-5X	① Drill one new mounting hole.

SPEAKER

ITEM No.	RATINGS: SIZE	RATINGS: FIELD	RATINGS: V. C. IMP.	CBS Columbia PART No.	JENSEN PART No.	QUAM PART No.	NOTES
SP1	6"	PM	3.6Ω	A-15832 ①	8T-108 Mod.P6-X	6A21	① Audio output transformer is mounted on this speaker.
SP2	6"	PM	3.6Ω	A-15833	8T-108 Mod. P6-X	6A21	

CBS-COLUMBIA
MODEL 27C31 (Ch. 1027-1)

PARTS LIST & DESCRIPTION (continued)

COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	CBS Columbia PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	Ant. Coils	0Ω CT	0Ω					
L2	Fil. Choke	0Ω						
L3	Neutr. Coil	0Ω						
L4	RF, Mixer Grid & Osc. Coils	0Ω						
L5	Fil. Choke	0Ω						
L6	RF Choke	0Ω						
L7	1st. Video IF	1.2Ω						
L8	RF Choke	1.2Ω						
L9	Fil. Choke	.27Ω		PA28276	19-3001	TV-189	6175	.82 Microhenry, (IRC part #CL-1)
L10	2nd. Video IF	.2Ω		PB3392	17-1003	TV-102	6188	
L11	Fil. Choke	.27Ω		PA28276	19-3001	TV-189	6175	.82 Microhenry, (IRC part #CL-1)
L12	3rd. Video IF	.5Ω		PB28320			6246	Includes trap
L13	Fil. Choke	.27Ω		PA28276	19-3001	TV-189	6175	.82 Microhenry, IRC part #CL-1
L14	4th. Video IF	.2Ω		PB3392	17-1003	TV-102	6188	
L15	RF Choke	2.6Ω		PA28253			4626	21 Microhenries
L16	Fil. Choke	.27Ω		PA28276	19-3001	TV-189	6175	.82 Microhenry (IRC part # CL-1)
L17	5th. Video IF	.2Ω		PB3392	17-1004	TV-103	6189	
L18	Series Peaking Coil	9Ω		PC28255-2	19-3180	TV-184	6154	194 Microhenries
L19	Shunt Peaking Coil	13Ω		PC28255-8	19-3300	TV-185	6155	303 Microhenries
L20	Shunt Peaking Coil	5Ω		PC28255-1	19-3125	TV-181	4644	130 Microhenries
L21	4.5MC Trap	1.9Ω		PA28286	20-1004	TV-151	1470	
L22	Series Peaking Coil	5Ω		PC28255-1	19-3125	TV-181	4644	130 Microhenries
L23	Shunt Peaking Coil	10.5Ω		PC28255-11	19-3180	TV-184	6154	209 Microhenries
L24	Sound IF	1.9Ω		PA28286	17-3400	TV-151	1469	
L25	Ratio Det.	5.5Ω	1.8ΩCT	PB1201 *	17-3497	TV-115	6205	Tertiary winding -.7Ω
L26	Horiz. Osc.	50Ω		PA28263	19-1576	TV-163	6210	

* Alternate part #PB1202.

FILTER CHOKE

ITEM No.	RATINGS			REPLACEMENT DATA				
	TOTAL DIRECT CURRENT	D. C. RESISTANCE	INDUCTANCE (0 CURRENT 1000 ∿)	CBS Columbia PART No.	STANCOR PART No.	MERIT PART No.	Halldorson PART No.	TRIAD PART No.
L29	.230ADC	62.5Ω	1.74 Hy.	PB-1406	C-2325 ①	C-2991 ①	C5037 ①	C-21X ①

① Drill one new mounting hole.

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			CBS Columbia PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M1	3AG S/B P/T				315.600 (3AG S/B P/T 6/10A)		MDV 6/10	

MISCELLANEOUS

ITEM No.	PART NAME	CBS Columbia PART No.	NOTES
M2	Tuner	PC541215	
M3	Video Detector	PB28321	Assembly, includes 1N60 Crystal
M4	Switch	PA37111	Rotary wafer (local-distance-phono)
M5	Focus Magnet	PC3210	PM-includes centering lever and focus screw adj.
M6	Ion Trap		
M7	Correction Magnet		(2) used
	Cabinet	A60213	
	Back Cover	A62450	
	Knob	A39247-1	Local-distance-phono
	Knob	A39242-1	Channel Selector
	Knob	A39240-3	Fine tuning
	Knob	A39241-1	Off/on/volume
	Knob	A39239-3	Contrast
	Knob	A39246-1	(3) vert. hold, horiz. hold and brightness
	Mask	A62449	
	Safety Glass	A62457-18	

TROUBLE SHOOTING AIDS (cont)

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

POWER

DEAD SET

If filaments fail to light, check AC interlock assembly, switch on volume control and T1. If filaments light, check fuse M1. Substitute V24 and V25. Check B+ filter and decoupling network components.

SMALL AND/OR DIM PIX

Substitute V24. Check B+ filter and decoupling network components.

HIGH VOLTAGE

LOSS OF HIGH VOLTAGE

Check by substitution V19, V20, V21, V22 and V23. Check waveform W16.

If Satisfactory	If Unsatisfactory
Check C97, R119, T3, T5A, R112, R113, C91 and other associated components.	Check C85, C88, C89, C90, R104, R105 and other associated components.

INSUFFICIENT HIGH VOLTAGE

Check by substitution V19, V20, V21, V22, V23 and V24. Follow procedure outlined under "Loss Of High Voltage".

BLOOMING

Check by substitution V19, V20, V21, V22, V23 and V24. Check C97, R119, T3, T5A, R112, R113, C91, picture tube and other associated circuit components.

GENERAL

RASTER SOUND NO PIX

Follow procedure outlined under "Loss Of Video".

RASTER NO SOUND NO PIX

Check by substitution V1, V2, V3, V4, V5 and V6. Check associated circuit components. Check video detector assembly.

NO RASTER NO SOUND

Follow procedure outlined under "Dead Set".

INTERMITTENT STREAKS

Check high voltage section for corona discharge and arcing.

Symptoms shown are assumed and are not indicative of the quality and workmanship of this equipment.

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

Touch-up adjustments of the RF Tuner Oscillator Circuit may be accomplished by removal of the Channel Selector and Fine Tuning knobs. The adjustments are accessible, one at a time, through the small hole in the cabinet to the right of the Channel Selector shaft.

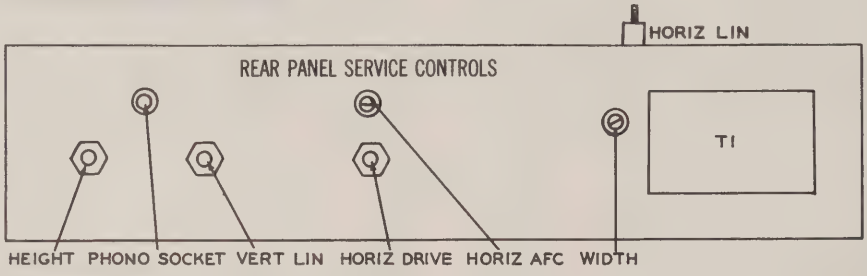
PICTURE TUBE SAFETY GLASS CLEANING

To clean safety glass remove three wood strips (top and sides) held in by three wood screws. Remove screws and strips and safety glass by tilting forward and lifting out. Use extreme caution when removing safety glass.

PICTURE TUBE REMOVAL

For picture tube removal it is necessary to remove chassis. (See disassembly instructions).

SERVICE ADJUSTMENT LOCATION



HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

Adjustment of the Horiz. Oscillator Circuit can be made from the rear panel of the chassis. Set the Horiz. Hold Control at the Mid-position of its range and adjust the Horiz. AFC slug (L26) until the picture synchronizes horizontally.

SOUND IF DETECTOR BUZZ ADJUSTMENT

To eliminate Sound IF Detector Buzz, adjust the Ratio Detector Secondary (L25) located on top of chassis. (See tube placement chart).

FUSES

One fuse is used for L. V. Power Supply protection. (For location, see tube placement chart).

CENTERING

Centering is accomplished mechanically by means of a centering lever on the P. M. Focusing assembly. Adjust the centering lever from side to side, and up and down until the picture is properly centered.

ANTI-PIN CUSHION ADJUSTMENT

Reduce the picture size so that the sides of the raster are visible, and position the magnets so that all sides are straight lines and the corners are at right angles.

DISASSEMBLY INSTRUCTIONS

1. Remove 8 push on type control knobs from front panel.
2. Disconnect built-in antenna and transmission line from rear panel of cabinet.
3. Remove 13 wood and 1 metal screws. Remove rear cover .
4. Disconnect speakers, yoke plug, CRT socket, high voltage lead, speaker and yoke ground.
5. Remove 5 chassis bolts. Remove chassis.
6. Remove 4 speaker nuts and remove speaker (2 speakers).

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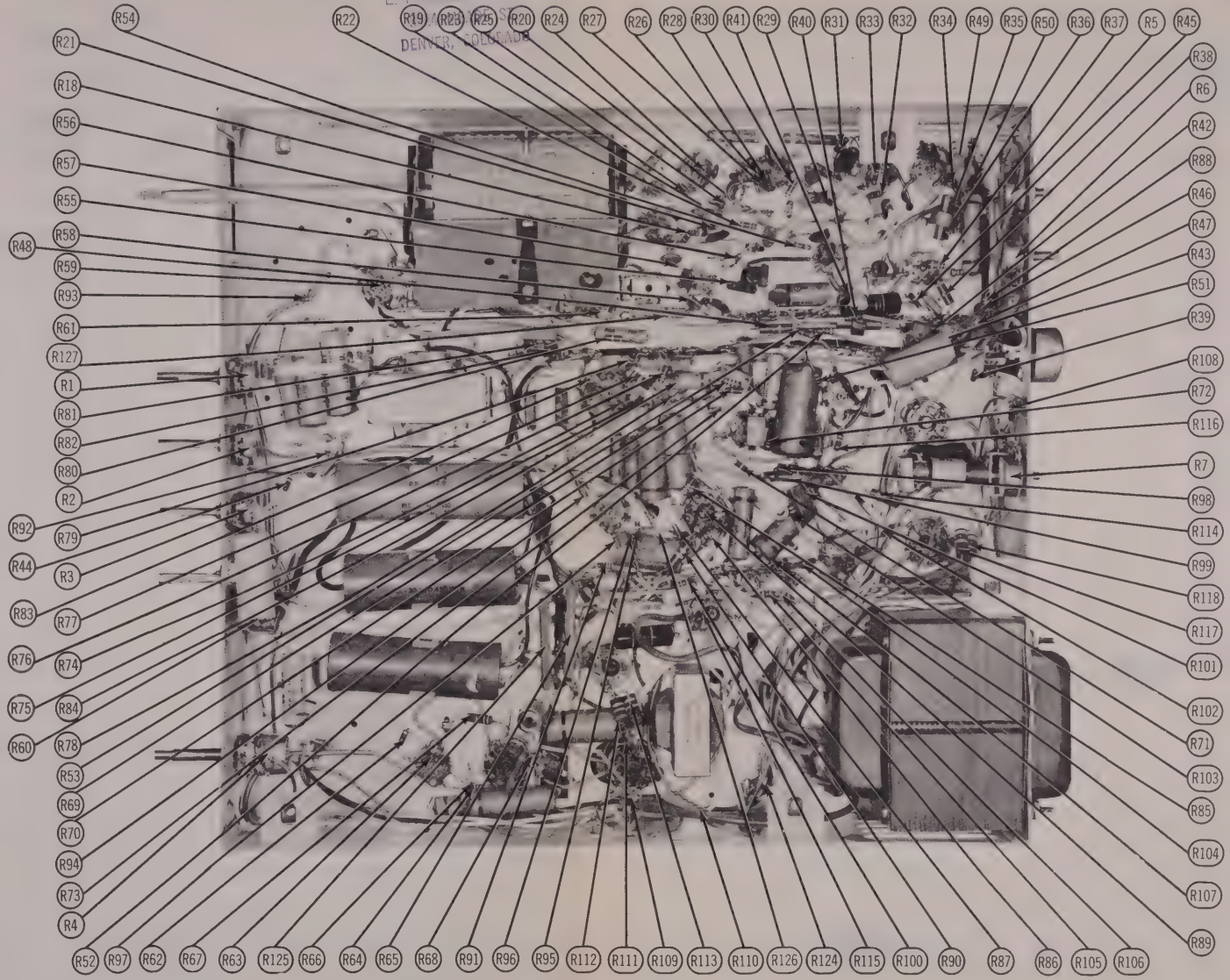
DENVER, COLORADO

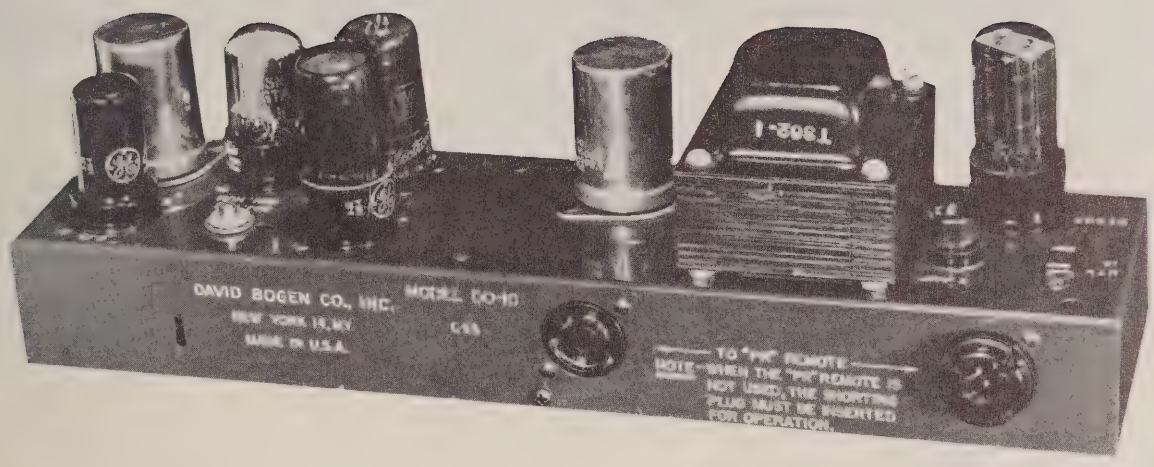


CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION

DAVID BOGEN MODEL DO10

PROPERTY OF
L. F. ELECTRONICS
3924 MEADE ST.
DENVER, COLORADO

DAVID BOGEN
MODEL DO10



DAVID BOGEN
MODEL DO10

TRADE NAME	David Bogen Model DO10
MANUFACTURER	David Bogen Co., Inc., 29 Ninth Ave., New York, 14, N.Y.
TYPE SET	AC Operated 10 Watt Audio Amplifier
TUBES (Five)	Types 6J5 AF Amp., 6SN7GT Phase Inv., (2) 6V6GT Audio Output, 5Y3GT Rectifier
POWER SUPPLY	110-120 Volts AC RATING .56 Amp. @ 117 Volts AC

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PARTS LIST AND DESCRIPTIONS

DAVID BOGEN
MODEL DO10

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		David Bogen PART No.	STANDARD REPLACEMENT		
V1	AF Amplifier	6J5	6J5	6Q	
V2	Phase Inverter	6SN7GT	6SN7GT	8BD	
V3	Audio Output	6V6GT	6V6GT	7S	
V4	Audio Output	6V6GT	6V6GT	7S	
V5	Rectifier	5Y3GT	5Y3GT	5T	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP.	VOLT	David Bogen PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C1A	▲10	450		AFH4-09		D008		WP433.6		
B	▲10	450								
C2A	▲10	450		AFH4-09		D008		WP433.6		
B	▲10	450								
C3	50	50		PRS50/50		BR505		TC39	TVA-1308	
C4	.05	400		P488-05	DF-503	PTE4S5		PT415	4TM-S5	
C5	100	500		1469-0001						
C6	.05	400		P488-05	DF-503	PTE4S5		PT415	4TM-S5	
C7	.05	400		P488-05	DF-503	PTE4S5		PT415	4TM-S5	

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	David Bogen PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	
R1A	500KΩ	½	V275A	Q13-133	AG-60-Z	AB-60	U-48	Volume Note
B	Shaft		Not Req.	Not Req.	FKS-1/4	AK-1	Not Req.	Attach to R1A
R2	400Ω	2					C400P	Hum Adj. wire-wound

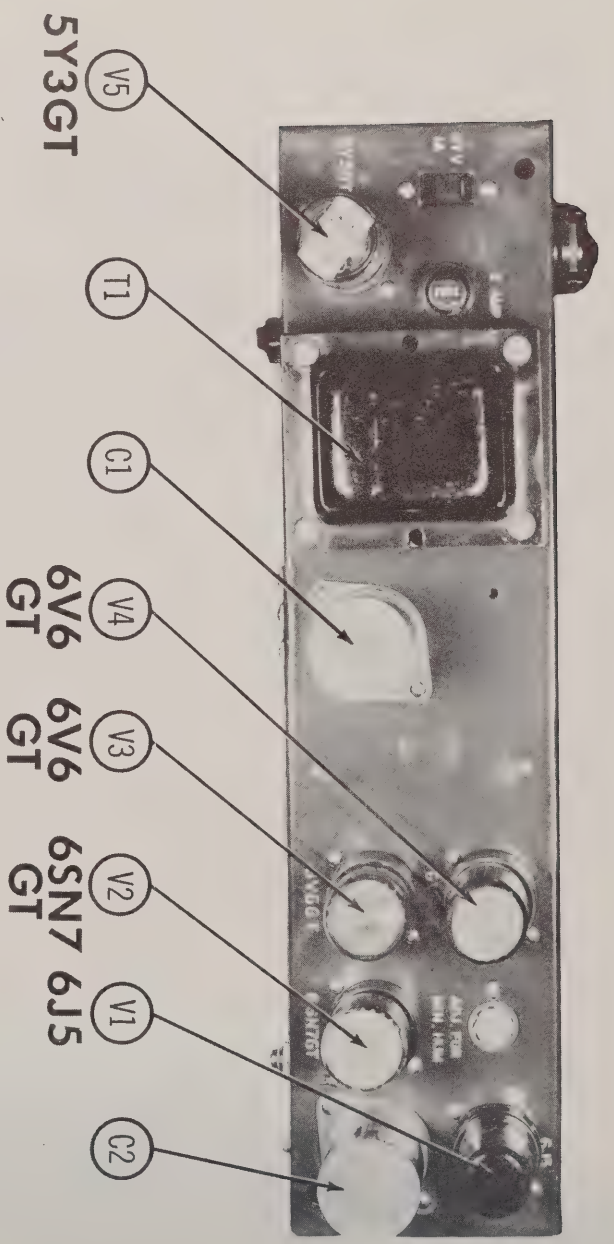
Note: Some models may use alternate control No. V275.

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	David Bogen PART No.	IRC PART No.	
R3	1000Ω	½		BTS-1000	
R4	47Ω	½		BTS-47	
R5	100KΩ	½		BTS-100K	
R6	470KΩ	½		BTS-470K	
R7	27KΩ	½		BTS-27K	
R8	470Ω	½		BTS-470	
R9	100KΩ	½		BTS-100K	
R10	100KΩ	½		BTS-100K	
R11	470KΩ	½		BTS-470K	
R12	270Ω	2			

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	David Bogen PART No.	IRC PART No.	
R13	47KΩ	2		BTB-47K	
R14	470KΩ	½		BTS-470K	
R15	1500Ω	½		BTS-1500	
R16	68KΩ	½		BTS-68K	
R17	47KΩ	½		BTS-47K	
R18	150Ω	4	R-1517	PW4-150	
R19	3300Ω	2		BTB-3300	
R20	3300Ω	½		BTS-3300	

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA				
	PRI.	SEC. 1	SEC. 2	SEC. 3	David Bogen PART No.	STANCOR PART No.	MERIT PART No.	Halldorson PART No.	TRIAD PART No.
T1	117VAC @ .56A	700VCT .072A	5VAC @ 2A	6.3V @1.38A	T-362-1 ①	PM-8409	P-2952	P9310 ②	R-11B

① Center tap on 6.3V winding not used
② Drill new mounting holes.

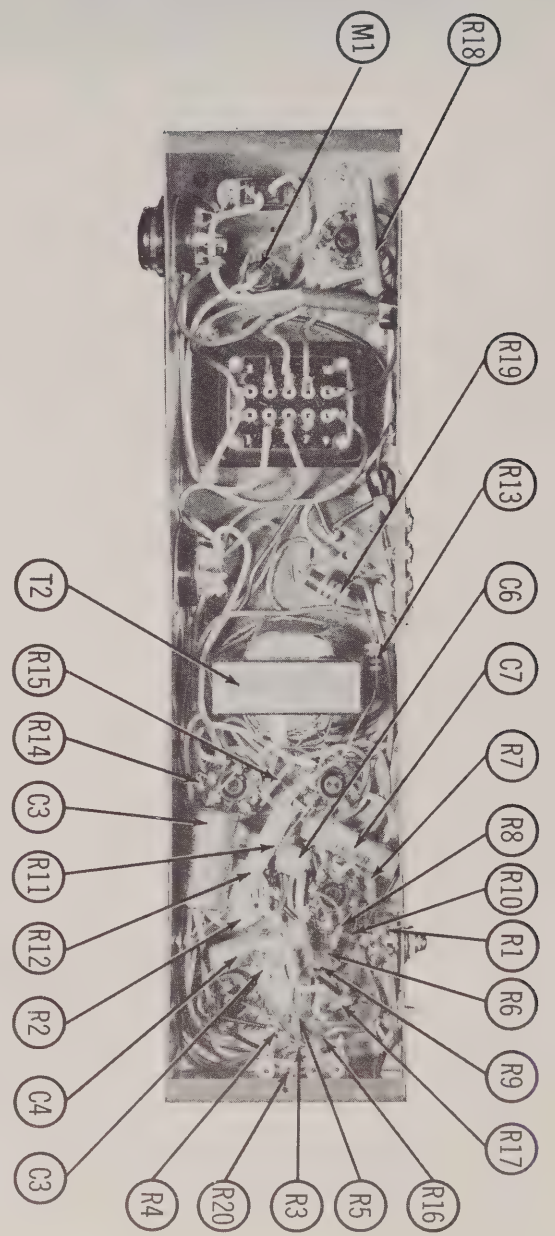
TRANSFORMER (AUDIO OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA					NOTES
	IMPEDANCE		DC RES.		David Bogen PART No.	STANCOR PART No.	MERIT PART No.	Halldorson PART No.	TRIAD PART No.	
	PRI.	SEC.	PRI.	SEC.						
T2	10KΩ CT	15Ω tap @ 8Ω, 4Ω	386Ω CT	.91Ω tap @ .67Ω .46Ω	T-292		A-3027			

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			David Bogen PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M1	3AG	2A			312002. (3AG-2A)	342001	AGC2	HCM

CHASSIS—BOTTOM VIEW



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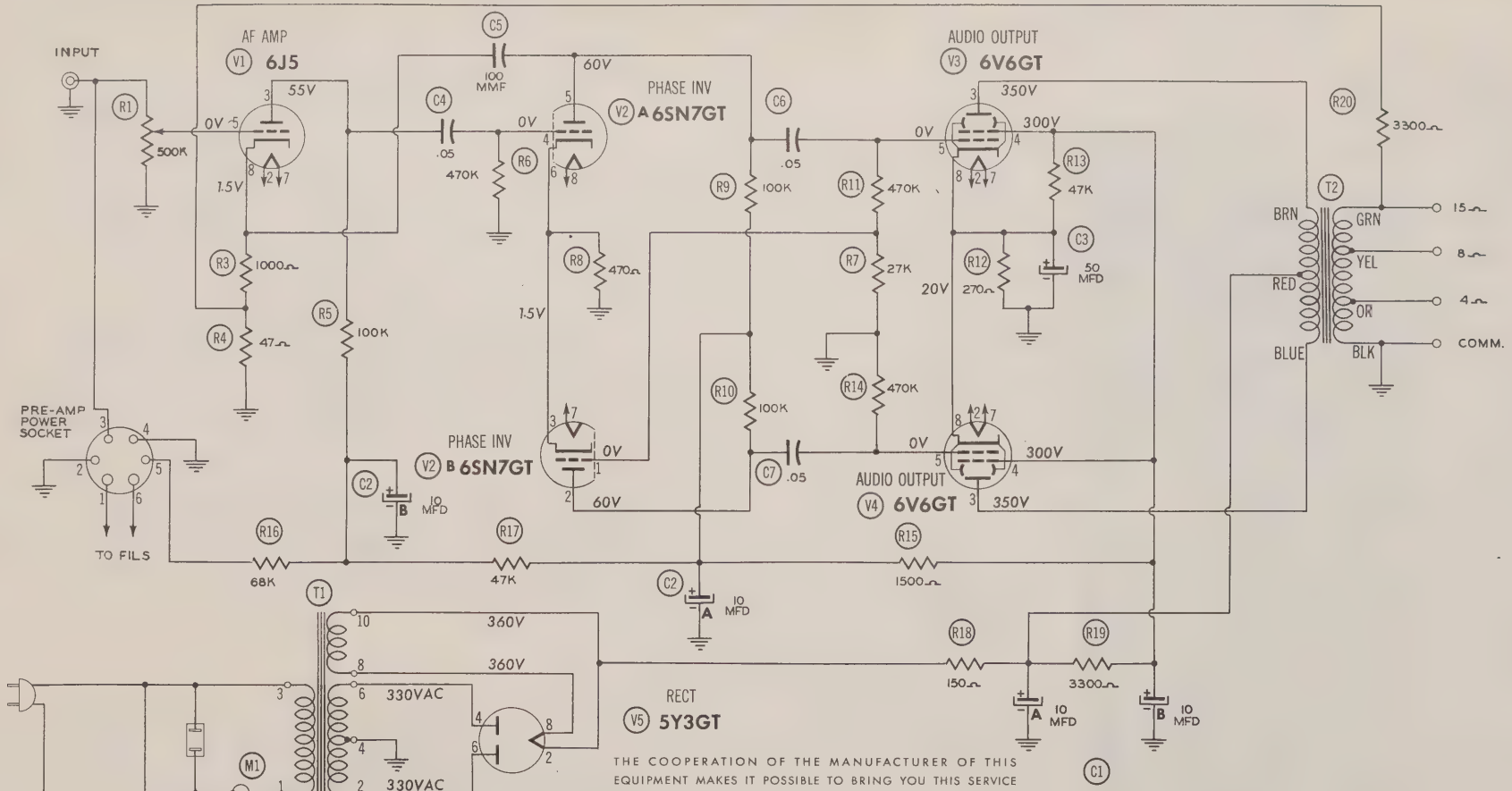
3924 MEADE ST
DENVER, COLORADO

DAVID BOGEN
MODEL DO10

DAVID BOGEN
MODEL DO10



RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
V 1	6J5	0Ω	100Ω	†150KΩ	INF	500KΩ	†150KΩ	100Ω	1KΩ
V 2	6SN7GT	27KΩ	†105KΩ	470Ω	470KΩ	†105KΩ	470Ω	100Ω	100Ω
V 3	6V6GT	INF	100Ω	†190Ω	†3.5KΩ	500KΩ	27KΩ	100Ω	270Ω
V 4	6V6GT	INF	100Ω	†190Ω	†3.5KΩ	470KΩ	†5KΩ	100Ω	270Ω
V 5	5Y3GT	INF	50KΩ	†150Ω	180Ω	INF	165Ω	INF	50KΩ

† MEASURED FROM PIN 2 OF V5

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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1 - DC voltage measurements are at 20,000 ohms per volt, AC voltages measured at 1000 ohms per volt.
2 - Socket connections are shown as bottom views.
3 - Measured values are from socket pin to common negative.
4 - Line voltage maintained at 117 volts for voltage readings.
5 - Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6 - All controls at minimum, proper output load connected.

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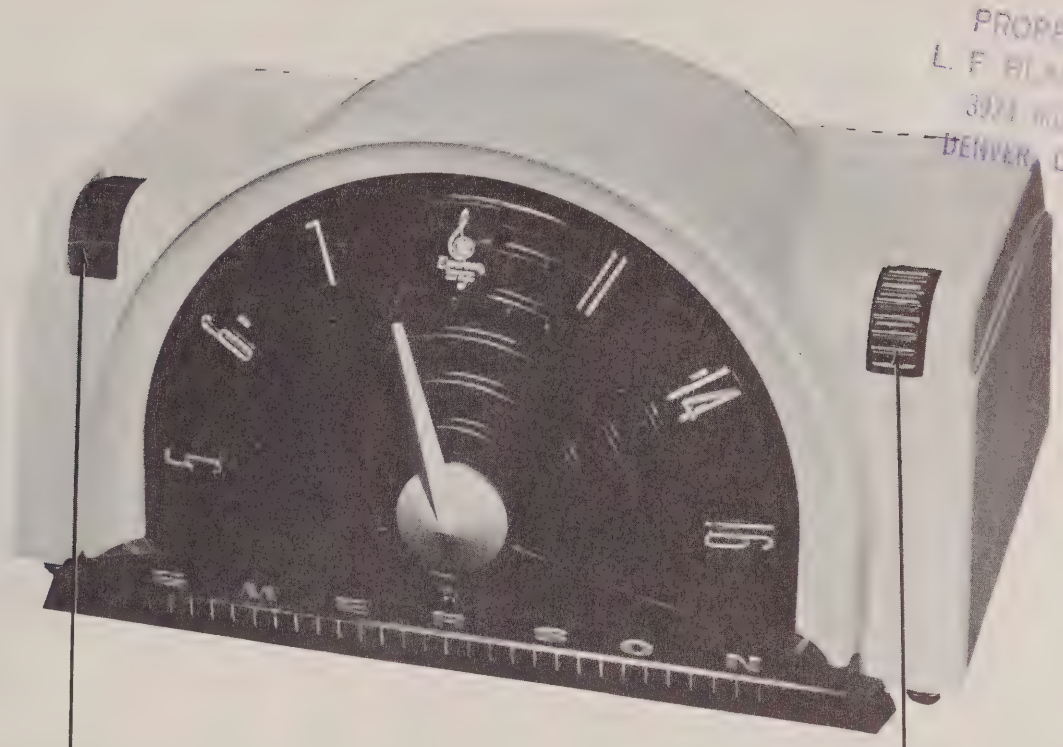
DENVER, COLORADO

EMERSON
MODEL 744B (Ch. 120175-B)



EMERSON
MODEL 744B (Ch. 120175-B)

TRADE NAME	Emerson Model 744B (Ch. 120175-B)
MANUFACTURER	Emerson Radio & Phono Corp., 111 Eighth Ave., New York, N.Y.
TYPE SET	AC-DC Operated AM Superheterodyne Receiver
TUBES (Five)	Types 12BE6 Conv., 12BA6 IF Amp., 12AT6 Det.-AVC-AF Amp., 50C5 Audio Output, 35W4 Rectifier
POWER SUPPLY	105-125 Volts AC-DC — RATING .24 Amp. @ 117 Volts AC
TUNING RANGE—BROADCAST	540-1620KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Use isolation transformer, if available. If not, connect a .1MFD capacitor in series with low side of signal generator and B-. Volume control should should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.
To set pointer, turn tuning capacitor fully closed and set pointer to last reference mark at low frequency end of dial.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.001MFD	High side to pin 7 (grid) of 12BE6 (V1). Low side to B-.	455KC (400~Mod)	Tuning gang fully open	Across voice coil	A1, A2, A3, A4	Adjust for maximum deflection.
2.		Loop	1620KC	"	"	A5	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3.		"	1400KC	Tune to 1400KC signal	"	A6	"

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PARTS LIST AND DESCRIPTIONS

EMERSON
MODEL 744B (Ch. 120175-B)

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA: EMERSON PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RETMA BASE TYPE	NOTES
V1	Converter	12BE6	12BE6	7CH	
V2	IF Amp.	12BA6	12BA6	7BK	
V3	Det-AVC-AF Amp.	12AT6	12AT6	7BT	
V4	Audio Output	50C5	50C5	7CV	
V5	Rectifier	35W4	35W4	5BQ	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: EMERSON PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C1A	50	150	925235	PRS150/50-30		BBRD5315		TCD497	TVA-2450	Red Green
B	30	150								
C2	.05	400	923554	P488-05	DF-503	PTE4S5		PT415	4TM-S5	
C3A	220		*923024	*PA-113-1	*PC-150		*1408-01		*103C4	
B	2000									
C	5000									
D	250									
E										
C4	.02	400	923524	P488-02	DF-203	PTE4S2		PT412	4TM-S2	
C5	.05	400	923554	P488-05		PTE4S5		PT415	4TM-S5	
C6	.05	400	923554	P488-05		PTE4S5		PT415	4TM-S5	
C7	2.4			SI2.4NP0	TCN-2.2				5TCCB-V22	

* Items C3A, C3B, C3C, C3D, C3E, R5A, R5B and R5C are combined in one unit.
When replacing items separately C3D and C3E should total 250MMF.

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: EMERSON PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	500KΩ	½	390221	Q13-133	AG-60-Z	B-58	U-48	Volume
B	Shaft		Not Req.	Not Req.	FS-3	Not Req.	Not Req.	Attach to R1A
C	Switch		Not Req.	76-1	SWB	Not Req.	US-26	Attach to R1A

RESISTORS

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: EMERSON PART No.	IRC PART No.	NOTES
R2	22KΩ	½		BTS-22K	
R3	120Ω	½	340272	BTS-120	
R4	3.3Meg	½	351332	BTS-3.3Meg	
R5A	6.8Meg	½	*923024	BTS-6.8Meg	
B	470KΩ	½		BTS-470K	
C	470KΩ	½		BTS-470K	

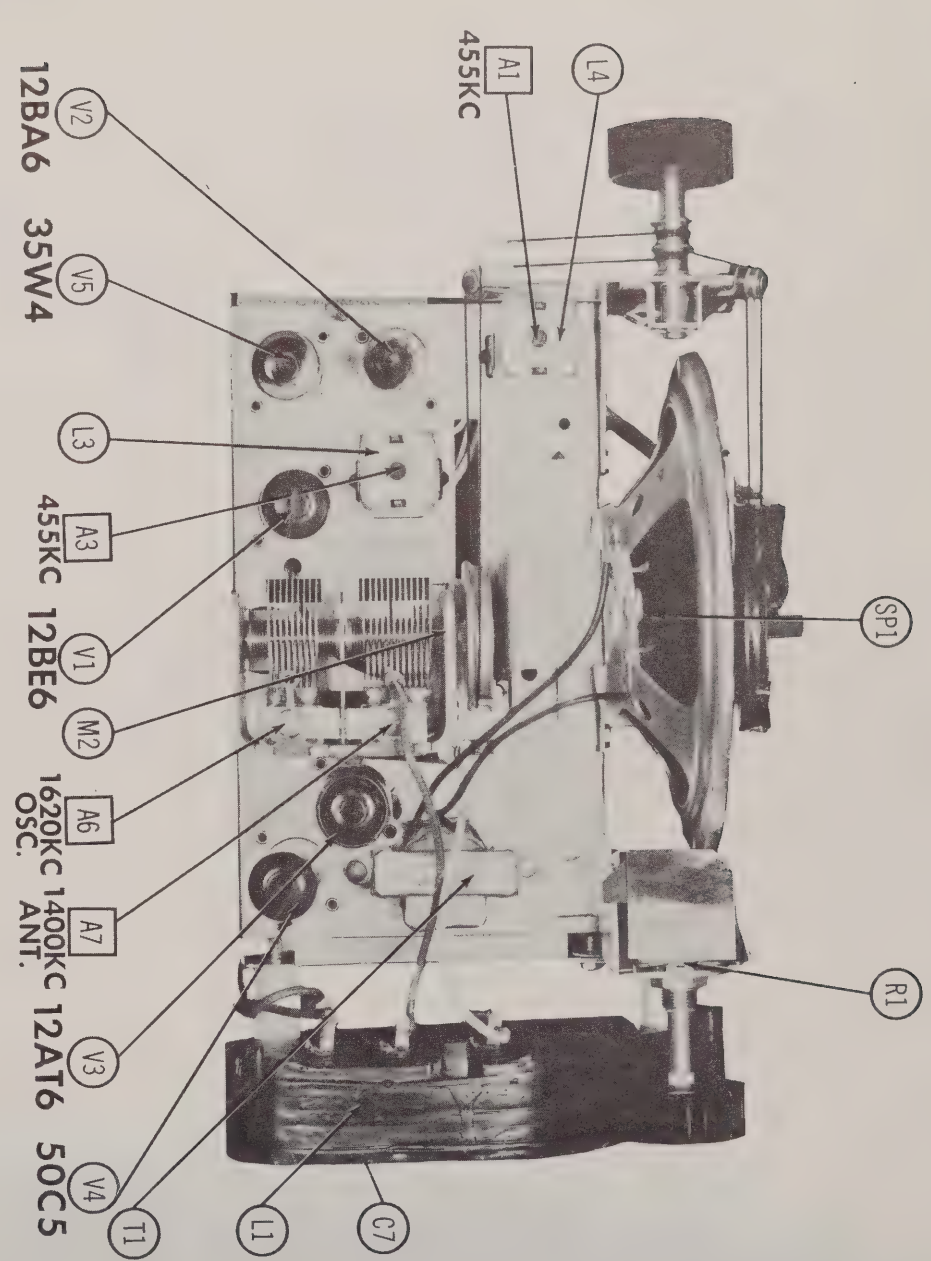
ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: EMERSON PART No.	IRC PART No.	NOTES
R6	10KΩ	½	350732	BTS-10K	
R7	150Ω	½	340292	BTS-150	
R8	1500Ω	1	380532	BTA-1500	
R9	18Ω	½	340072	BTS-18	

Items R5A, R5B, R5C, C3A, C3B, C3D, C3E are combined in one unit.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	RATING: IMPEDANCE PRI.	RATING: IMPEDANCE SEC.	RATING: DC RES. PRI.	RATING: DC RES. SEC.	REPLACEMENT DATA: EMERSON PART No.	STANCOR PART No.	MERIT PART No.	Halldorson PART No.	TRIAD PART No.	NOTES
T1	2.3KΩ	3.2Ω	183Ω	.9Ω	734087	A-3332	A-3025	Z1101	S-1X ①	① Drill one new mounting hole.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA			NOTES
	SIZE	FIELD	V. C. IMP.	EMERSON PART No.	JENSEN PART No.	QUAM PART No.	
SP1	5"	PM	3.2Ω	180101	ST-105 Mod. P5-X	5A1	

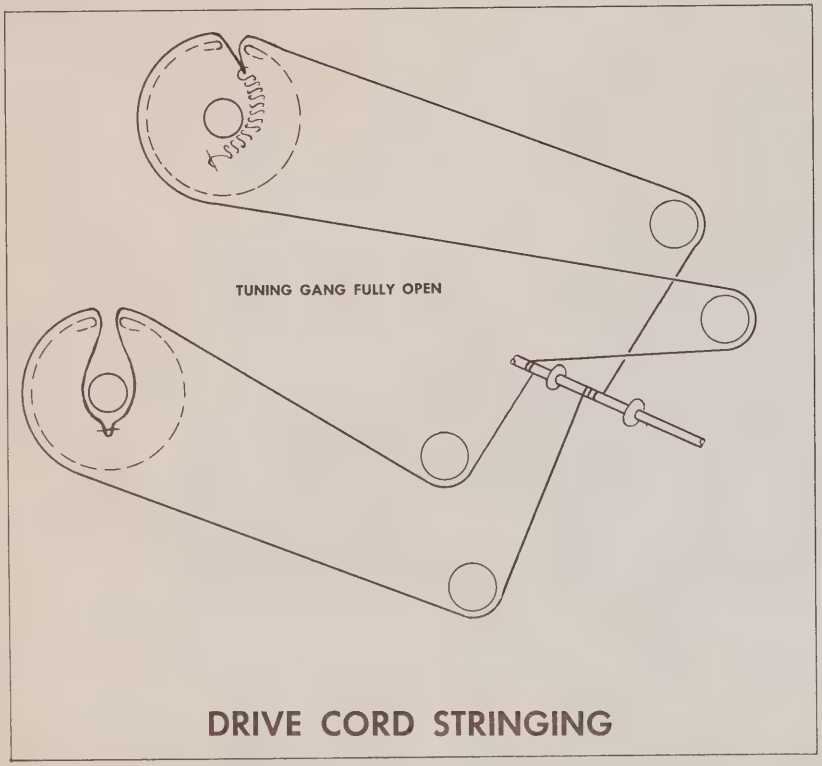
COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	EMERSON PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	Loop Ant.	2. 8Ω		700083			69-Osc. *	
L2	Osc. Coil	.5Ω	6. 5Ω	716075	14-1073		12-C1	
L3	Input IF	17Ω	17Ω	720033	16-6758	BC-352	12-C1	
L4	Output IF	17Ω	17Ω	720033	16-6758	BC-353	12-C2	

* Drill mounting hole.

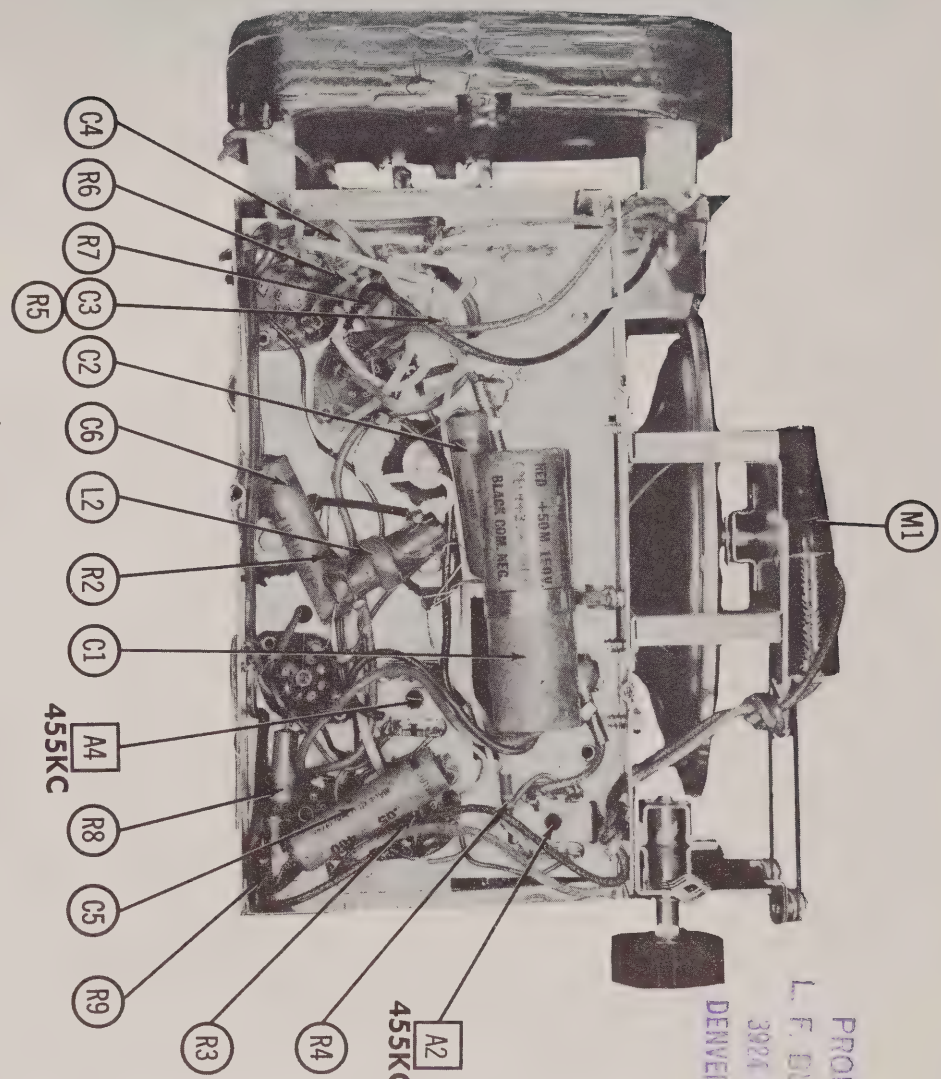
MISCELLANEOUS

ITEM No.	PART NAME	EMERSON PART No.	NOTES
M1	Dial light	807000	# 47 bayonet
M2	Tuning cap.	900093	2 gang (30-382MMF, 20-175MMF)
	Cabinet	140482	Ebony
	Cabinet	140482A	Flame
	Knob	460417	(2) off-on volume, tuning
	Pointer	460382	
	Jewel	635042	Pilot light



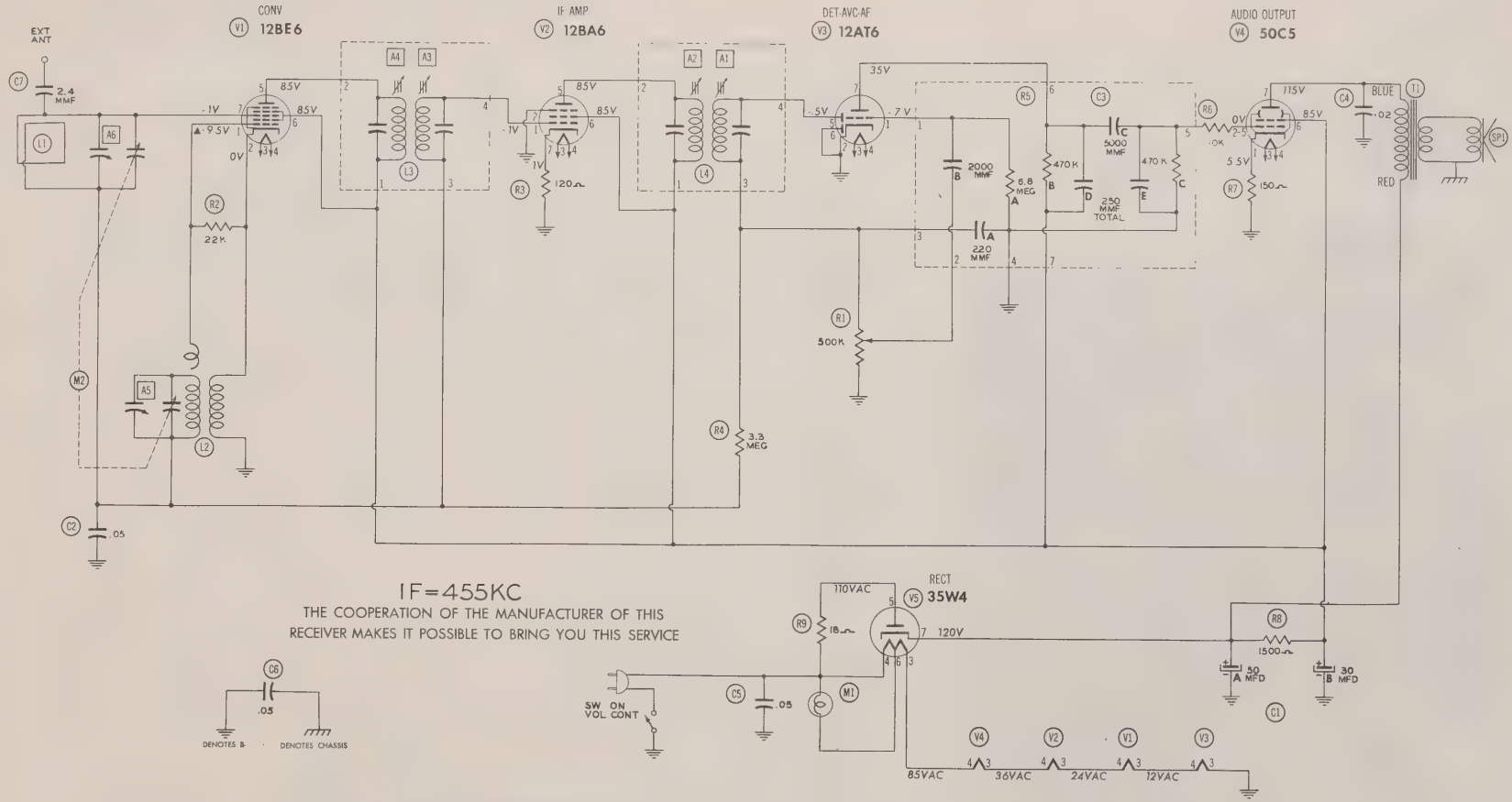
DRIVE CORD STRINGING

CHASSIS—BOTTOM VIEW



PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

EMERSON
MODEL 744B (Ch. 120175-B)



IF=455KC

THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V 1	12BE6	22KΩ	.5Ω	14Ω	26Ω	†1.5KΩ	†1.5KΩ	3.8Meg
V 2	12BA6	3.8Meg	0Ω	26Ω	38Ω	†1.5KΩ	†1.5KΩ	120Ω
V 3	12AT6	6.8Meg	0Ω	0Ω	14Ω	500KΩ	0Ω	†470KΩ
V 4	50C5	150Ω	480KΩ	38Ω	90Ω	480KΩ	†1.5KΩ	†180Ω
V 5	35W4	INF	INF	90Ω	120Ω	135Ω	115Ω	100KΩ

† MEASURED FROM PIN 7 OF V5

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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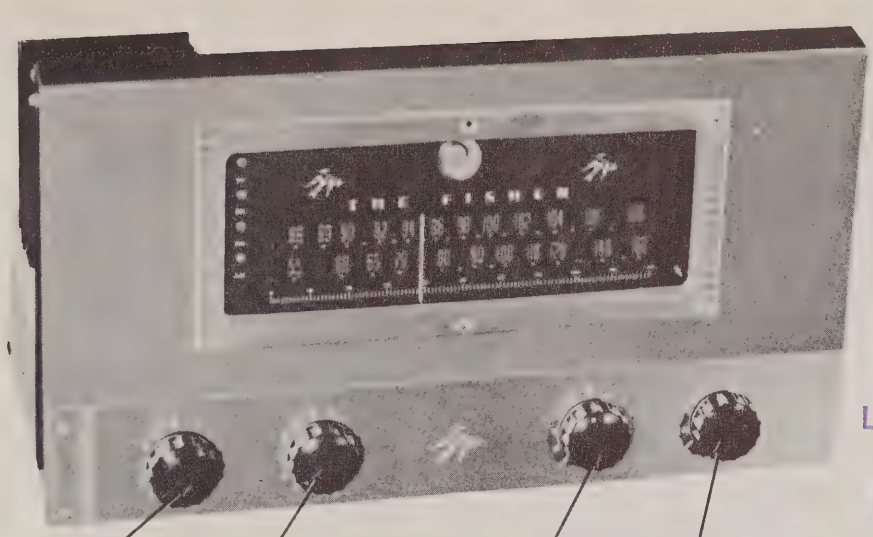
1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

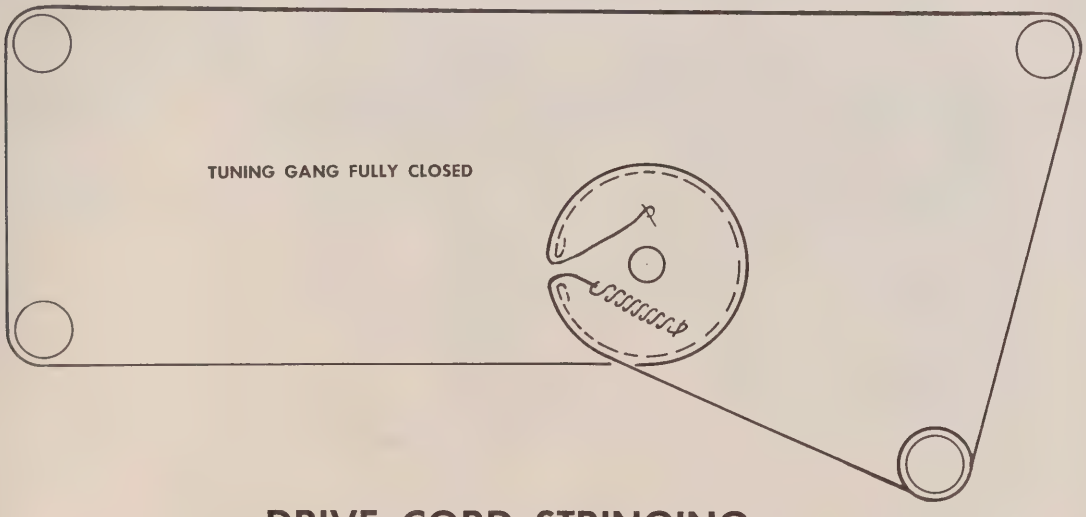
FISHER
MODELS 50R, 50RT



PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST
DENVER, COLORADO

FISHER
MODELS 50R, 50RT

TRADE NAME	Fisher Models 50R, 50RT		
MANUFACTURER	Fisher Radio Corp., 45-41 Vam Dam St., Long Island City, N.Y.		
TYPE SET	AC Operated AM-FM Superheterodyne Tuner for Custom Installation		
TUBES	Fourteen		
POWER SUPPLY	105-125 Volts AC-50/60 Cycles	RATING	.64 Amp. @ 117 Volts AC
TUNING RANGE - BROADCAST	535-1620KC	FREQ. MOD.	88-108MC



DRIVE CORD STRINGING

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

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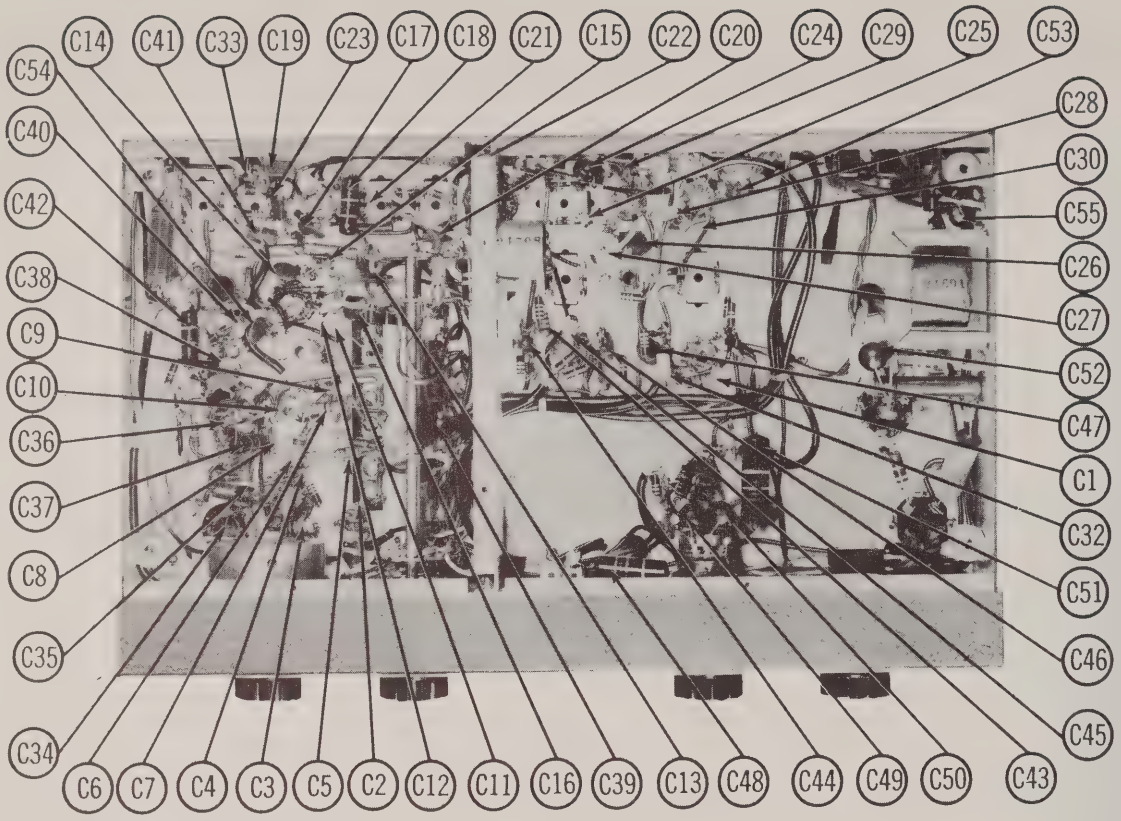
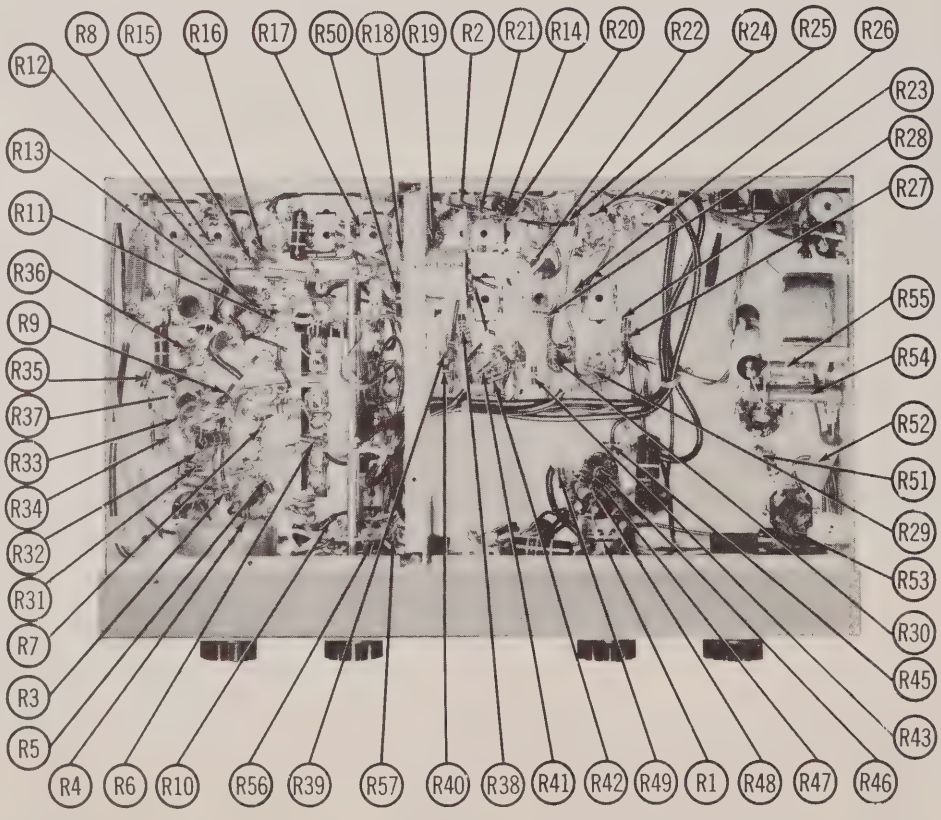
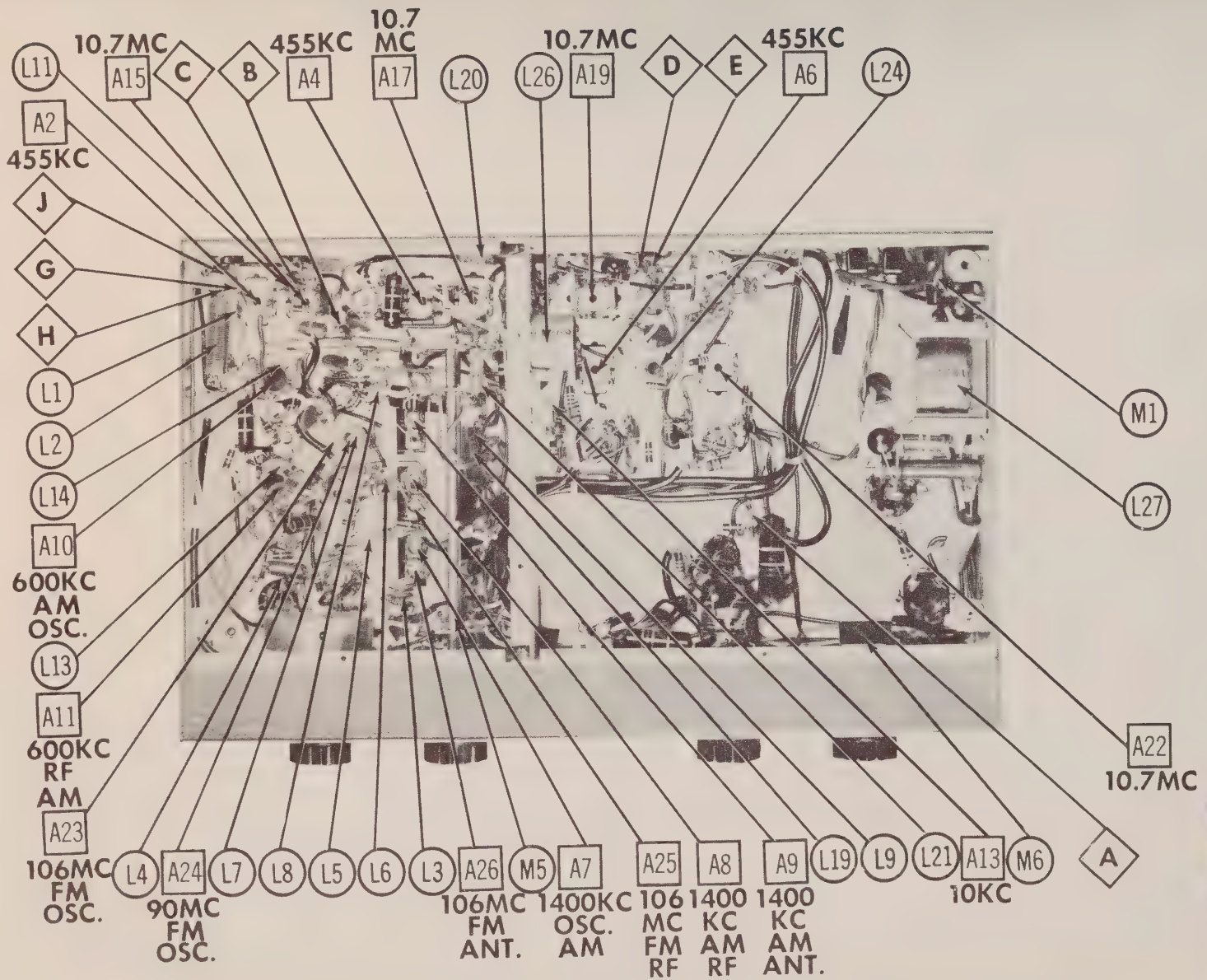


CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION

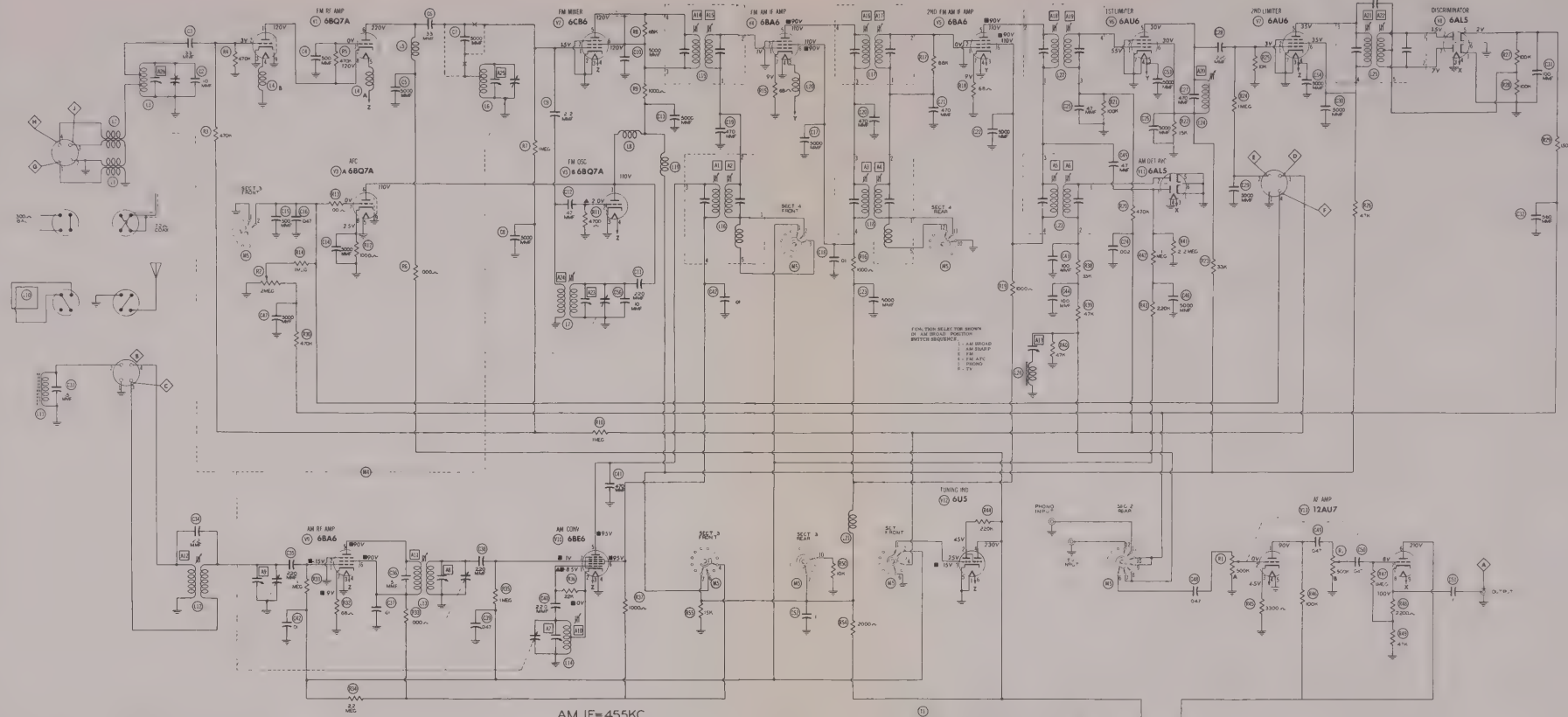


CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION



CHASSIS BOTTOM VIEW - ALIGNMENT AND INDUCTOR IDENTIFICATION

PROPERTY OF
DENVER, COLORADO


FM RF AMP V1 6BQ7A
FM MIXER V2 6BA6
FM OSC V3 6BQ7A
AFC V4 6BQ7A
FM AM IF AMP V3 6BA6
2ND FM AM IF AMP V5 6BA6
1ST LIMITER V6 6AU6
2ND LIMITER V7 6AU6
DISCRIMINATOR V8 6AL5
AM DET RVC V11 6AL5
AM RF AMP V9 6BA6
AM CONV V10 6BE6
TUNING IND V12 6U5
AF AMP V13 12AU7
RECT V14 5Y3GT
AM IF=455KC
FM IF=10.7MC
THE COOPERATION OF THE MANUFACTURER OF THIS
RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6BQ7A	INF	370KΩ	0Ω	2Ω	2Ω	↑ 1.3KΩ	INF	INF	0Ω
V 2	6CB6	1.5Meg	0Ω	0Ω	1Ω	1Ω	↑ 3.3KΩ	0Ω		
V 3	6BQ7A	↑ 2.3KΩ	4.7KΩ	0Ω	0Ω	1Ω	↑ 2.3KΩ	1.5Meg	1KΩ	0Ω
V 4	6BA6	2.3Meg ■ 2.1Meg	0Ω	6Ω	0Ω	↑ 3.3KΩ	↑ 3.3KΩ	68Ω		
V 5	6BA6	5.2Ω	0Ω	1Ω	0Ω	↑ 3.3KΩ	↑ 3.3KΩ	68Ω		
V 6	6AU6	100KΩ	0Ω	1Ω	0Ω	↑ 3.3KΩ	↑ 3.3KΩ	0Ω		
V 7	6AU6	10KΩ	0Ω	0Ω	1Ω	↑ 50KΩ	↑ 10KΩ	0Ω		
V 8	6AL5	0Ω	100KΩ	0Ω	1Ω	180KΩ	0Ω	100KΩ		
V 9	6BA6	■ 100KΩ	0Ω	0Ω	1Ω	↑ 3.3KΩ	↑ 3.3KΩ	56Ω		
V 10	6BE6	22KΩ	7Ω	1Ω	0Ω	■ 3.3KΩ	■ 3.3KΩ	■ 100KΩ		
V 11	6AL5	0Ω	150KΩ	1Ω ↑ 330KΩ	0Ω	0Ω	0Ω	■ 1.5Meg		
V 12	6U5	0Ω	↑ 220KΩ	■ 2.5Meg	↑ 220KΩ	0Ω	1Ω			
V 13	12AU7	↑ 105KΩ	105KΩ ■ 68Ω	3.3KΩ	0Ω	↑ 5KΩ	1Meg	50KΩ ■ 68Ω	1Ω	
V 14	5Y3GT	INF	■ 15KΩ	INF	144Ω	INF	150Ω	INF	■ 15KΩ	

ALL MEASUREMENTS TAKEN IN "FM -AFC" POSITION UNLESS OTHERWISE SPECIFIED
■ MEASURED IN "AM BROAD" PORTION.
↑ MEASURED FROM PIN #8 OF V14.

1- DC voltage measurements are at 20,000 ohms per volt, AC voltages measured at 1000 ohms per volt.
2- Socket connections are shown as bottom views.
3- Measured values are from socket pin to common negative.
4- Line voltage maintained at 117 volts for voltage readings.
5- Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6- Volume control at maximum, no signal applied for voltage measurements.

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231-7

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.
With tuning gang fully closed set pointer to last reference mark at low frequency end of dial.
Set AFC control to maximum clockwise position.

AM ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.01MFD	High side to pin 7 (grid) of 6BE6 (V10). Low side to chassis.	455KC (400∿Mod)	AM Sharp	1000KC (Approx)	From point Ⓐ to chassis	A1, A2, A3, A4, A5, A6	Adjust for maximum deflection.
2.	200MMF	High side to point Ⓑ . Low side to chassis.	1400KC	"	1400KC	"	A7, A8, A9	Disconnect loop antenna. Connect point Ⓒ to chassis. Adjust A7, A8 and A9 for maximum deflection.
3.	"	"	600KC	"	600KC	"	A10, A11, A12	Adjust for maximum deflection. Repeat Steps 2 and 3.
4.	.01MFD	Use audio signal generator High side to pin 2 (diode plate) of 6AL5 (V11). Low side to chassis.	10KC	"	Quiet point on dial	"	A13	Adjust for MINIMUM deflection. Remove jumper from point Ⓒ to chassis.

FM IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
5.	Direct	High side to ungrounded tube shield over 6CB6 (V2) Low side to chassis.	10.7MC (Unmod.)	FM-AFC	Non-interfering point on dial	DC probe to point Ⓓ . Common to chassis.	A14, A15 A16, A17 A18, A19	Adjust for maximum deflection.
6.	"	"	"	"	"	DC probe to point Ⓔ . Common to chassis.	A20	"
7.	"	"	"	"	"	DC probe to point Ⓕ . Common to chassis.	A21	Detune A22 SLIGHTLY and adjust A21 for maximum deflection.
8.	"	"	"	"	"	"	A22	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.

FM IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60∿ modulation and 450KC sweep. Use 120∿ sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT SCOPE	ADJUST	REMARKS
5.	Direct	High side to ungrounded tube shield floating over 6CB6 (V2). Low side to chassis.	10.7MC	FM-AFC	Non-interfering point on dial	Vert. Amp. thru 10KΩ to point Ⓓ. Low side to chassis.	A14, A15 A16, A17 A18, A19	Adjust for response curve of maximum amplitude and symmetry as in Fig. 1.
6.	"	"	"	"	"	Vert. Amp. thru 10KΩ to point Ⓔ. Low side to chassis.	A20	"
7.	"	"	"	"	"	Vert. Amp. thru 10KΩ to point Ⓕ. Low side to chassis.	A21	Detune A22 and adjust A21 for curve of maximum amplitude and symmetry as in Fig. 1.
8.	"	"	"	"	"	"	A22	Adjust A22 so that 10.7MC occurs at center of crossover lines as in Fig. 2. SLIGHTLY retouch A21 for maximum amplitude and straightness of crossover lines.

FM RF AND MIXER ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
9.	Two 120Ω Carbon Resistors	High side to point Ⓗ Low side to point Ⓖ	106MC	FM	106MC	DC probe to point Ⓓ . Common to chassis.	A23	Connect point Ⓙ to chassis. Adjust A23 for maximum deflection.
10.	"	"	90MC	"	90MC	"	A24	Adjust for maximum deflection. Repeat steps 9 and 10.
11.	"	"	106MC	"	106MC	"	A25, A26	Adjust for maximum deflection.
12.	"	"	90MC	"	90MC	"		Compress or expand coil forms of L3 and L6 for maximum deflection on VTVM. Repeat steps 11 and 12.

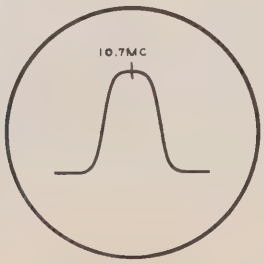


FIG. 1

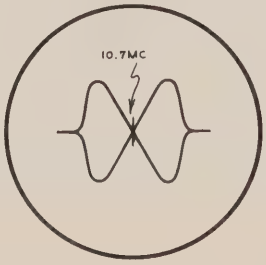


FIG. 2

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

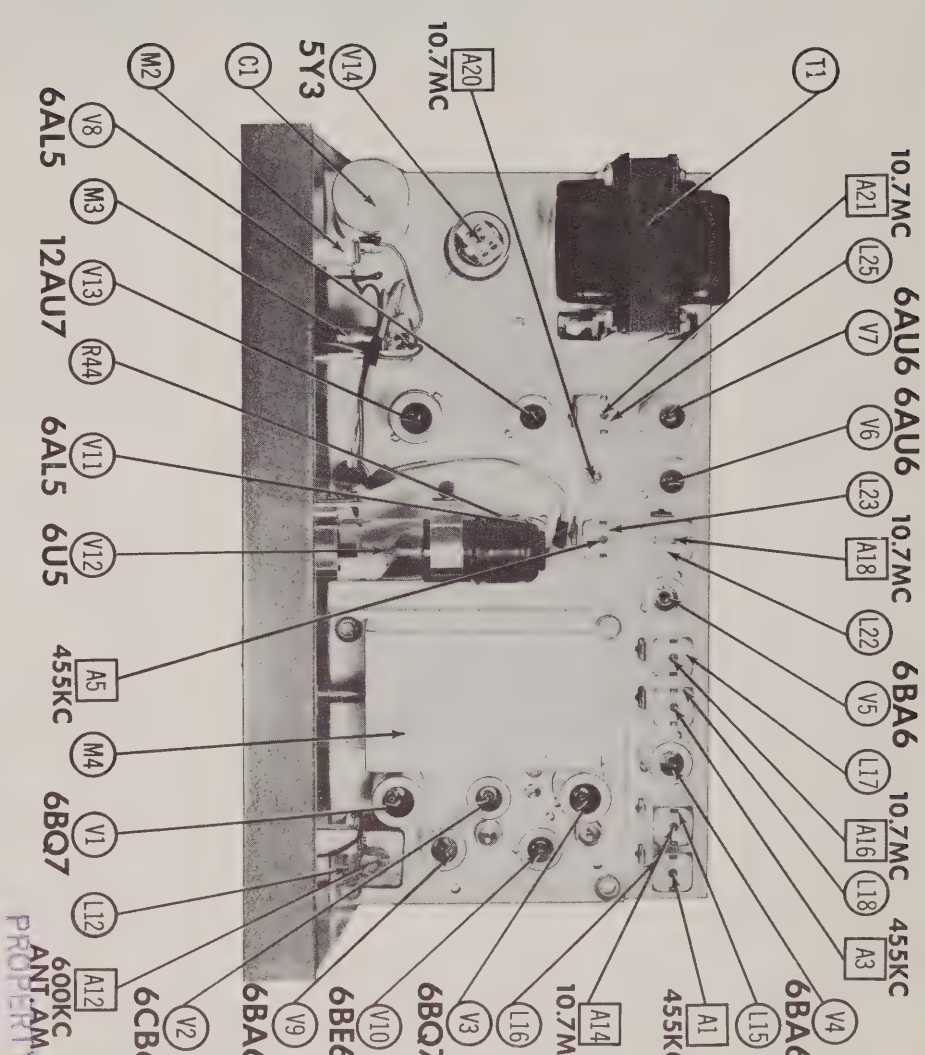
ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		FISHER PART No.	STANDARD REPLACEMENT		
V1	FM RF Amplifier	6BQ7A	6BQ7A	9AJ	
V2	FM Mixer	6CB6	6CB6	7CM	
V3	FM Osc.-AFC	6BQ7A	6BQ7A	9AJ	
V4	FM-AM IF Amp.	6BA6	6BA6	7BK	
V5	2nd. FM AM IF Amp.	6BA6	6BA6	7BK	
V6	Limiter	6AU6	6AU6	7BK	
V7	Limiter	6AU6	6AU6	7BK	
V8	Discriminator	6AL5	6AL5	6BT	
V9	AM RF Amplifier	6BA6	6BA6	7BK	
V10	AM Converter	6BE6	6BE6	7CH	
V11	AM Detector-AVC	6AL5	6AL5	6BT	
V12	Tuning Indicator	6U5	6U5	6R	
V13	AF Amplifier	12AU7	12AU7	9A	
V14	Rectifier	5Y3GT	5Y3GT	5T	

CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP.	VOLT	FISHER PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C1A	▲40	300		AFH3-44		DO46		FP377	R1327	
B	■40	300		PRS450/40		BR4035		TC78		
C	▲40	300								
D	40	300								
C2	10			SI10NP0	TCZ-10		NP0K-100	ZT-541	5TCC-Q1	
C3	33			SI33	D6-330		GP1K-330	UC-5433	5GA-Q33	
C4	500			SI500	D6-501	TM5T5	GP2K-501	UC-535	5GA-T5	
C5	5000			SI5000	D6-502	TM5D5	GP2-333-502	UC-525	5GA-D5	
C6	33			SI33	D6-330		GP1K-330	UC-5433	5GA-Q33	
C7	5000			SI5000	D6-502	TM5D5	GP2-333-502	UC-525	5GA-D5	
C8	5000			BPD-005	MD-502	TM5D5	811-005	DC-525	5HK-D5	
C9	2.2									
C10	5000			BPD-005	MD-502	TM5D5	811-005	DC-525	5HK-D5	
C11	220			SI220	D6-221		GP2K-221	UC-5322	5GA-T22	
C12	47				TCZ-47		NP0K-470	ZT-5447	5TCC-Q47	
C13	5000			BPD-005	MD-502	TM5D5	811-005	DC-525	5HK-D5	
C14	5000			BPD-005	MD-502	TM5D5	811-005	DC-525	5HK-D5	
C15	500			SI500	D6-501	TM5T5	GP2K-501	UC-535	5GA-T5	
C16	.047	400		P488-047	DF-503	PTE4S47		PT4147	4TM-S47	
C17	5000			BPD-005	MD-502	TM5D5	811-005	DC-525	5HK-D5	
C18	.01	400		P488-01	D6-103	PTE4S1	GP2-333-103	PT411	4TM-S1	
C19	470	500		1468-0005	D6-501	5W5T5	GP2K-471	MC-245	1FM-35	
C20	470	500		1468-0005	D6-501	5W5T5	GP2K-471	MC-245	1FM-35	
C21	470	500		1468-0005	D6-501	5W5T5	GP2K-471	MC-245	1FM-35	
C22	5000			BPD-005	MD-502	TM5D5	811-005	DC-525	5HK-D5	
C23	5000			BPD-005	MD-502	TM5D5	811-005	DC-525	5HK-D5	
C24	.022	400		P488-022	DD-203	PTE4S22		PT4122	4TM-S22	
C25	47				TCZ-47		NP0K-470	ZT-5447	5TCC-Q47	
C26	5000			BPD-005	MD-502	TM5D5	811-005	DC-525	5HK-D5	
C27	470						NP0K-471			
C28	220			SI220	D6-221		GP2K-221	UC-5322	5GA-T22	
C29	5000			BPD-005	MD-502	TM5D5	811-005	DC-525	5HK-D5	
C30	5000			BPD-005	MD-502	TM5D5	811-005	DC-525	5HK-D5	
C31	100			SI100	D6-101	TM5T1	GP1K-101	UC-531	5GA-T1	
C32	560			SI560	D6-561		GP2K-561	UC-5356	5GA-T56	
C33	15				TCZ-15				5TCC-Q15	
C34	2.2									
C35	220			SI220	D6-221		GP2K-221	UC-5322	5GA-T22	
C36	5			SI5	D6-050		GP1K-050		5GA-V5	
C37	.01	400		P488-01	D6-103	PTE4S1	GP2-333-103	PT411	4TM-S1	
C38	220			SI220	D6-221		GP2K-221	UC-5322	5GA-T22	
C39	.047	400		P488-047	DF-503	PTE4S47		PT4147	4TM-S47	
C40	220			SI220	D6-221		GP2K-221	UC-5322	5GA-T22	
C41	470			1468-005	D6-471	5W5T5	811-005	MC-245	1FM-35	
C42	.01	400		P488-01	D6-103	PTE4S1	GP2-333-103	PT411	4TM-S1	
C43	100			SI100	D6-101	TM5T1	GP1K-101	UC-531	5GA-T1	
C44	100			SI100	D6-101	TM5T1	GP1K-101	UC-531	5GA-T1	
C45	47				TCZ-47		NP0K-470	ZT-5447	5TCC-Q47	
C46	5000			BPD-005	MD-502	TM5D5	811-005	DC-525	5HK-D5	
C47	5000			BPD-005	MD-502	TM5D5	811-005	DC-525	5HK-D5	
C48	.047	400		P488-047	DF-503	PTE4S47		PT4147	4TM-S47	

(CONT'D ON NEXT PAGE)

CHASSIS—TOP VIEW



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PARTS LIST AND DESCRIPTIONS (Continued)

CAPACITORS (cont)

ITEM No.	RATING CAP.	RATING VOLT	REPLACEMENT DATA FISHER PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C49	.047	400		P488-047	DF-503	PTE4S47		PT4147	4TM-S47	
C50	.047	400		P488-047	DF-503	PTE4S47		PT4147	4TM-S47	
C51	.1	400		P488-1	DF-104	PTE4P1		PT401	4TM-P1	
C52	.1	400		P488-1	DF-104	PTE4P1		PT401	4TM-P1	
C53	5000			BPD-005	MD-502	TM5D5	811-005	DC-525	5HK-D5	
C54	5000			BPD-005	MD-502	TM5D5	811-005	DC-525	5HK-D5	
C55	.01	600		P688-01		PTE6S1		PT611	6TM-S1	
C56	10			SH0	D6-100		GP1K-101	UC-531	5GA-T1	

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA FISHER PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	500KΩ	½	R50000-1	Q13-133	DC-10-Z	BB-104	UF55A	Volume
B	500KΩ	½	Not Req.	M13-133	Not Req.	Not Req.	UR55A	
C	Shaft		Not Req.	Not Req.	Not Req.	Not Req.	DS-36	Attach to R1A
R2A	2Meg	½	R-2815-12	Q11-139	AG-83-S	AB-75	SU-56	AFC
B	Shaft		Not Req.	Not Req.	FKS-1/4	AK-1	Not Req.	Attach to R2A

RESISTORS

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA FISHER PART No.	IRC PART No.	NOTES
R3	470KΩ	½		BTS-470K	
R4	470KΩ	½		BTS-470K	
R5	470KΩ	½		BTS-470K	
R6	1000Ω	½		BTS-1000	
R7	1Meg	½		BTS-1Meg	
R8	68KΩ	½		BTS-68K	
R9	1000Ω	½		BTS-1000	
R10	1Meg	½		BTS-1Meg	
R11	4700Ω	½		BTS-4700	
R12	1000Ω	½		BTS-1000	
R13	100Ω	½			
R14	1Meg	½		BTS-1Meg	
R15	68Ω	½		BTS-68	
R16	1000Ω	½		BTS-1000	
R17	68KΩ	½		BTS-68K	
R18	68Ω	½		BTS-68	
R19	1000Ω	½		BTS-1000	
R20	470KΩ	½		BTS-470K	
R21	100KΩ	½		BTS-100K	
R22	15KΩ	½		BTS-15K	
R23	33KΩ	½		BTS-33K	
R24	1Meg	½		BTS-1Meg	
R25	10KΩ	½		BTS-10K	
R26	47KΩ	½		BTS-47K	
R27	100KΩ	½		BTS-100K	
R28	100KΩ	½		BTS-100K	
R29	150KΩ	½		BTS-150K	
R30	470KΩ	½		BTS-470K	

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA FISHER PART No.	IRC PART No.	NOTES
R31	1Meg	½		BTS-1Meg	
R32	68Ω	½		BTS-68	
R33	1000Ω	½		BTS-1000	
R34	22Meg	½		BTS-22Meg	
R35	1Meg	½		BTS-1Meg	
R36	22KΩ	½		BTS-22K	
R37	1000Ω	½		BTS-1000	
R38	33KΩ	½		BTS-33K	
R39	47KΩ	½		BTS-47K	
R40	47KΩ	½		BTS-47K	
R41	2.2Meg	½		BTS-2.2Meg	
R42	1Meg	½		BTS-1Meg	
R43	220KΩ	½		BTS-220K	
R44	220KΩ	½		BTS-220K	
R45	3300Ω	½		BTS-3300	
R46	100KΩ	½		BTS-100K	
R47	1Meg	½		BTS-1Meg	
R48	2200Ω	½		BTS-2200	
R49	47KΩ	½		BTS-47K	
R50	10KΩ	2		BTB-10K	
R51	47Ω	1			
R52	200Ω	5		1 3/4A-200	
R53	4700Ω	½		BTS-4700	
R54	2000Ω	10		1 3/4A-2000	
R55	15KΩ	2		BTB-15K	
R56	22Ω	½		BTS-22	
R57	22Ω	½		BTS-22	

TRANSFORMER (POWER)

ITEM No.	RATING PRI.	RATING SEC. 1	RATING SEC. 2	RATING SEC. 3	REPLACEMENT DATA FISHER PART No.	STANCOR PART No.	MERIT PART No.	Halldorson PART No.	TRIAD PART No.
T1	117VAC @.64A	540VCT .083A	5VAC @2A	6.3VAC @.91A SEC.4 6.3VAC @3.54A					

PARTS LIST AND DESCRIPTIONS (Continued)

COILS (RF-IF)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA FISHER PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L1	FM Ant. Trans	.8Ω	.8Ω					
L2	FM Ant. Trans	.8Ω	.8Ω					
L3	FM Ant. Coil	0Ω						Tapped
L4A	Fil. Choke	.2Ω					4604	1.4Microhenries
B	Fil. Choke	.3Ω					4604	1.4Microhenries
L5	FM RF Choke	1.8Ω					4606	2.2Microhenries; IRC Part #CLA
L6	FM RF Coil	0Ω						Tapped
L7	FM Osc. Coil	0Ω	0Ω					
L8	FM RF Choke	.5Ω					4606	2.5 Microhenries
L9	Fil. Choke	.14Ω			19-3001	TV-189	6175	.47 Microhenries; IRC Part # CL-1
L10	AM Loop Ant.	.6Ω						
L11	AM Ant. Loading Coil	2.1Ω			19-3036	TV-180	4603	51 Microhenries
L12	AM Ant. Coil	60Ω	3.8Ω					
L13	AM RF Coil	140Ω	5Ω				A5495-RF	
L14	AM Osc. Coil	4.4Ω					71-Osc	Tapped @ .7Ω
L15	1st FM IF	.7Ω	.7Ω	ZZ2987	16-3487	FM-254	1463	
L16	1st AM IF	5.5Ω	5.5Ω	ZZ509-132A				Tertiary winding=.5Ω
L17	2nd FM IF	.7Ω	.7Ω	ZZ2987	16-3487	FM-254	1463	
L18	2nd AM IF	5.5Ω	5.5Ω	ZZ509-132A				Tertiary winding=.5Ω
L19	RF Choke	1.8Ω					4606	2.2Microhenries; IRC Part # CLA
L20	Fil. Choke	.44Ω			19-3001	TV-189	6175	.38 Microhenries; IRC Part # CLA
L21	RF Choke	1.8Ω					4606	2.2Microhenries; IRC Part # CLA
L22	3rd FM IF	1.8Ω	.5Ω	ZZ509-130	16-3487	FM-254	1463	
L23	3rd AM IF	9.5Ω	9.5Ω	ZZ2984	16-6758	BC-353	12-C2	
L24	4th FM IF	.3Ω						
L25	FM Discriminator	.7Ω	.9ΩCT	ZZ509-131		FM-253	1464	
L26	10KC Filter Choke	500Ω		24708				1 Hy.

FILTER CHOKE

ITEM No.	RATINGS TOTAL DIRECT CURRENT	RATINGS D. C. RESISTANCE	RATINGS INDUCTANCE (0 CURRENT 1000 ~)	REPLACEMENT DATA FISHER PART No.	STANCOR PART No.	MERIT PART No.	Halldorson PART No.	TRIAD PART No.
L27	.079A	200Ω	3.4 Hy.		C-2325 ①			

① Drill one new mounting hole.

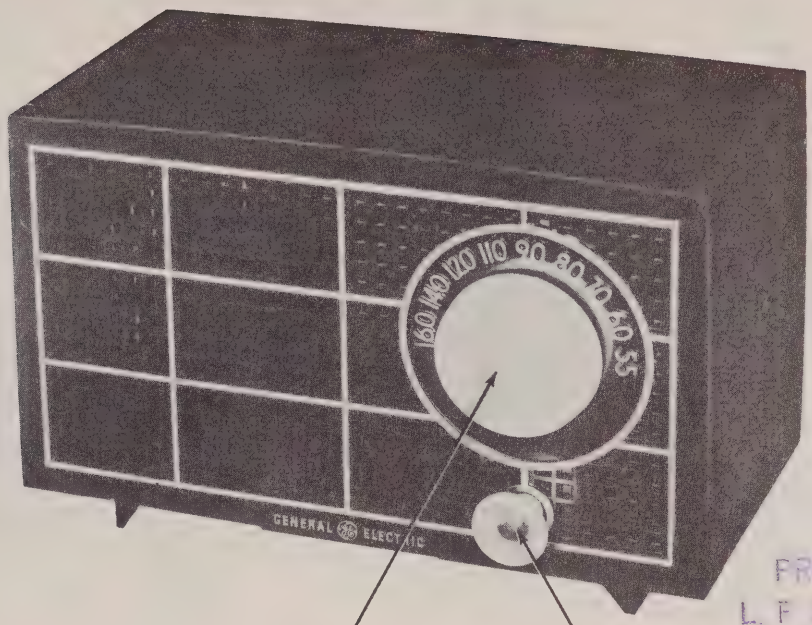
FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA FISHER PART No. FUSE	FISHER PART No. HOLDER	LITTELFUSE PART No. FUSE	LITTELFUSE PART No. HOLDER	BUSS-PART No. FUSE	BUSS-PART No. HOLDER
M1	3AG (Slo-Blo)	1Amp. 125V			313001. (3AG-1A Slo/Blo)	342001	MDL1	HKP

MISCELLANEOUS

ITEM No.	PART NAME	FISHER PART No.	NOTES
M2	Dial light		Type # 47 (2 used)
M3	Pilot light		Function indicator, type # 47 (4 used)
M4	Tuning capacitor		15-380MMF, 15-380 MMF, 29-170 MMF (includes FM tuning capacitor)
M5	Switch		Function selector
M6	Switch		Off-on
A13	Trimmer capacitor	C-3347	10KC filter, 65-315 MMF

GENERAL ELECTRIC
MODEL 419



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DENVER, COLORADO

GENERAL ELECTRIC
MODEL 419

TRADE NAME	General Electric Model 419
MANUFACTURER	General Electric Co., Electronics Dept., Electronics Park, Syracuse, N.Y.
TYPE SET	AC-DC Operated AM Superheterodyne Receiver
TUBES (Four)	Types 12AU6 Conv., 12AV6 Det.-AF Amp., 50C5 Audio Output, 35W4 Rectifier
POWER SUPPLY	105-120 Volts AC-DC RATING .21 Amp. @ 117 Volts AC
TUNING RANGE—BROADCAST	540-1620KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Use isolation transformer, if available. If not, connect a .1MFD capacitor in series with low side of signal generator and B-. Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.
Loop should be maintained in same relative position to chassis as when receiver is in cabinet.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.05MFD	High side to antenna stator lug on tuning gang. Low side to B-.	455KC (400∿Mod)	Tuning gang fully open	Across voice coil	A1	Adjust for maximum output. If isolation transformer is not used, reduce dummy antenna to .001MFD to reduce hum modulation. Adjust for maximum deflection with 10KΩ resitor across L4. Remove 10KΩ resistor .
2.	"	"	"	"	"	A2	Adjust for maximum output. If isolation transformer is not used, reduce dummy antenna to .001MFD to reduce hum modulation. Adjust for maximum deflection with 10KΩ resistor across L3. Remove 10KΩ resistor.
3.		Loop	1620KC	"	"	A3	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
4.		"	1500KC	Tune to 1500KC signal	"	A4	Adjust for maximum deflection while rocking tuning gang thru 1500KC signal . Repeat steps 3 and 4.

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PARTS LIST AND DESCRIPTIONS

GENERAL ELECTRIC
MODEL 419

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA: General Electric PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RETMA BASE TYPE	NOTES
V1	Converter	12AU6	12AU6	7BK	
V2	Det-AF Amp.	12AV6	12AV6	7BT	
V3	Audio Output	50C5	50C5	7CV	
V4	Rectifier	35W4	35W4	5BQ	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING CAP.	RATING VOLT	REPLACEMENT DATA: General Electric PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C1A	40	150	RCE-158	PRS150/40-20		EDL-4215		2N514	TVA-2438	Red
B	20	150				BR550		TC30	TVA-1203	Blue
C	5	25		PRS150/4						Green
C2	47		RCW-3075	SI47	D6-470		GP1K-470	UC-5447	5GA-Q47	
C3	27	500	UCU-1014							Note 1
C4	33	500	UCU-1016							Note 1
C5A	2000		♦RCW-309	BPD-002	DD-202		811-002	DC-522	5HK-D2	
B	50			SI50	D6-500		GP1K-500	UC-545	5GA-Q50	
C	220			SI220	D6-221		GP2K-221	UC-5322	5GA-T22	
D	5000			BPD-005	DD-502		811-005	DC-525	5HK-D5	
C6	.01	400	UCC-040	P488-01	D6-103	PTE4S1	GP2-333-103	PT411	4TM-S1	
C7	.05	400	UCC-045	489ZX-05		PJ4S5		PT415	4TM-S5	
C8	.05	400	UCC-045	488-05		PTE4S5		PT415	4TM-S5	

Note 1. Some Models reverse C3 and C4.
♦ Items C5A, C5B, C5C and C5D are combined in one unit.

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA: General Electric PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	2. 2Meg	½	RRC-214	Q13-139	AG-66-Z	AB-76	U-55	Volume
B	Shaft		Not Req.	Not Req.	KSS-3	AK-4	Not Req.	Attach to R1A
C	Switch		Not Req.	76-1	SWB	KB-1	US-26	Attach to R1A

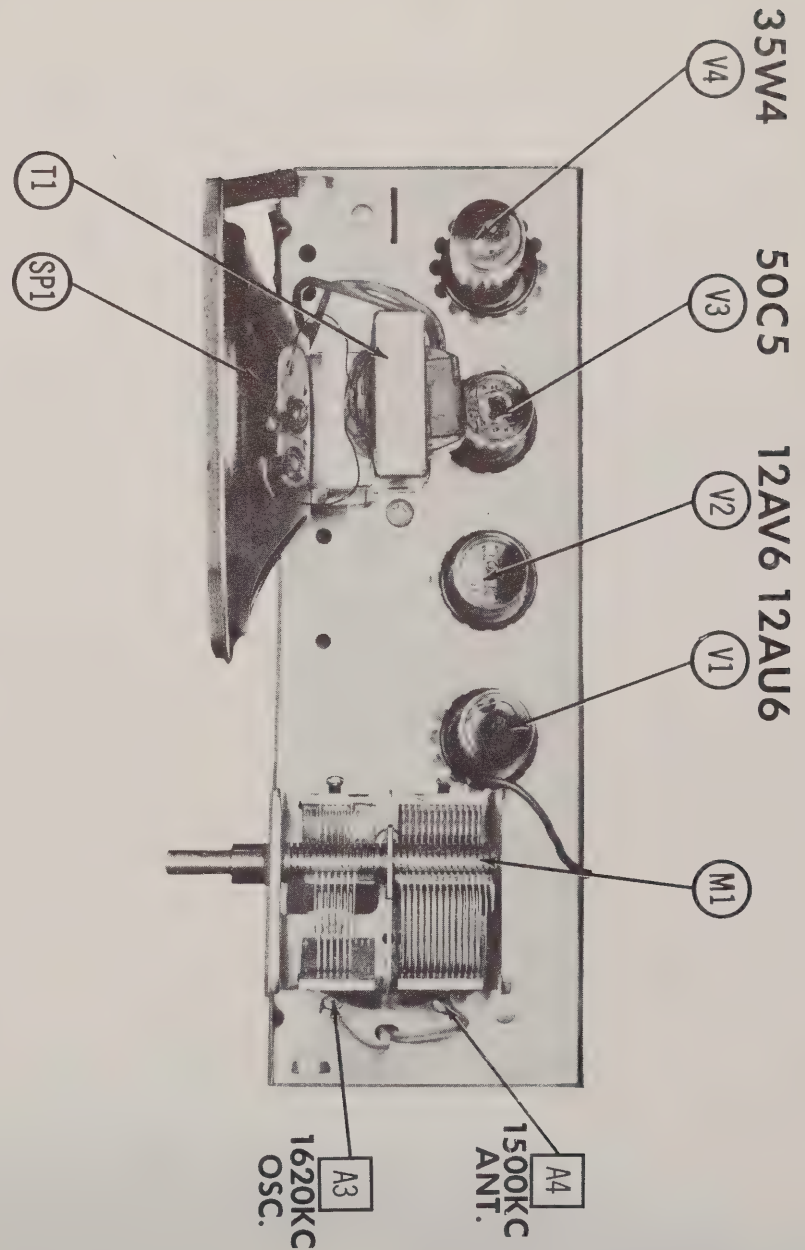
RESISTORS

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA: General Electric PART No.	IRC PART No.	NOTES
R2	2. 2Meg	½	URD-129	BTS-2. 2Meg	
R3	6. 8Meg	½	URD-141	BTS-6. 8Meg	
R4	470KΩ	½	URD-113	BTS-470K	
R5	470KΩ	½	URD-113	BTS-470K	

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA: General Electric PART No.	IRC PART No.	NOTES
R6	180Ω	½		BTS-180	Note 1
R7	10KΩ	½		BTS-10K	Note 2
R8	33Ω	2	URF-013		

Note 1. Some models may use a 150Ω resistor in this application.
Note 2. Some models may use a 6800Ω resistor in this application.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA					NOTES
	IMPEDANCE		DC RES.		General Electric PART No.	STANCOR PART No.	MERIT PART No.	Halldorson PART No.	TRIAD PART No.	
	PRI.	SEC.	PRI.	SEC.						
T1	2.4KΩ	3.1Ω	237Ω	.45Ω	RTO-137	A-3332	A-3025	Z1101	S-1X ①	

SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA			NOTES
	SIZE	FIELD	V. C. IMP.	General Electric PART No.	JENSEN PART No.	QUAM PART No.	
SP1	4"	PM	3.1Ω	ROP-026	ST-113 Mod. P4-X	4A1	

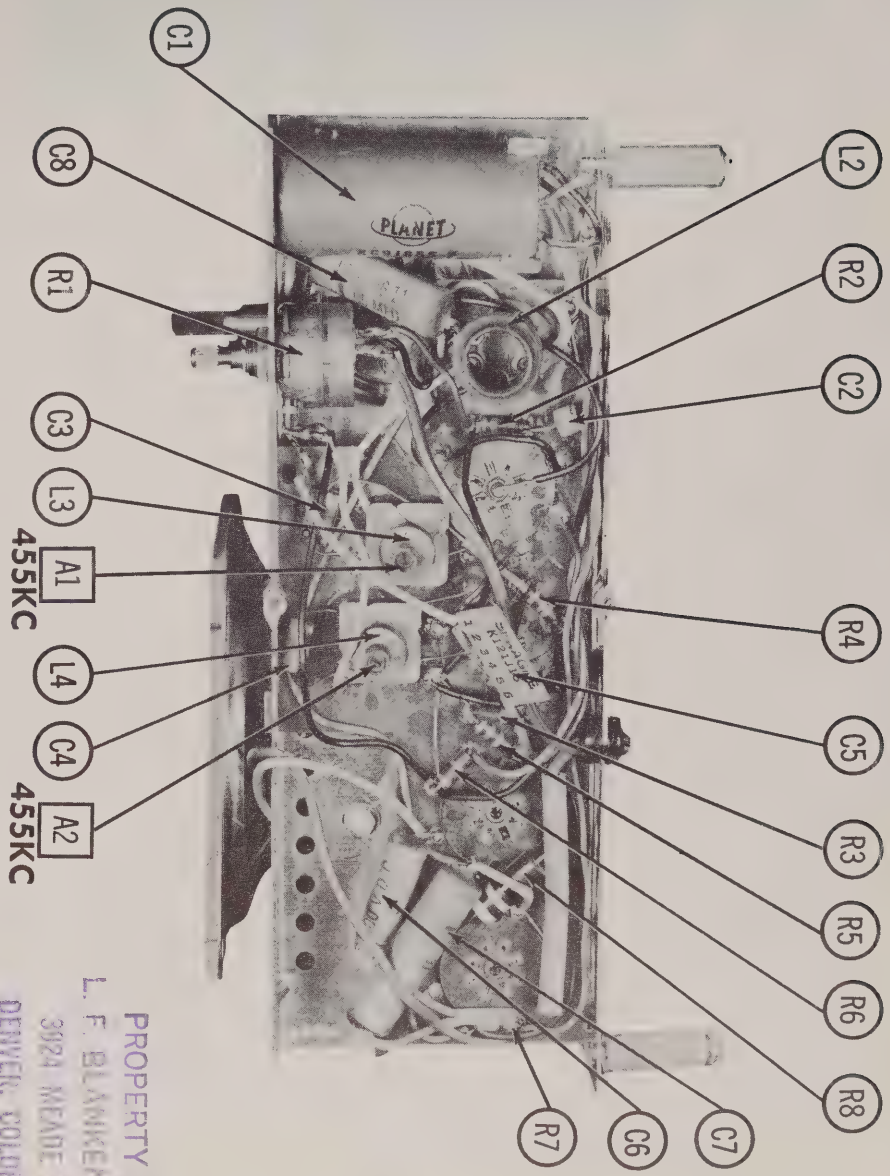
COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	General Electric PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	Loop Ant.	0Ω	2.8Ω	RAB-211				Includes cabinet back
L2	Osc. Coil	Pri. #1 1.9Ω						
		Pri. #2 1.1Ω	7.5Ω	RLC-128				
L3	IF Trans. Primary	32Ω		RTL-150				Tapped @ .8Ω
L4	IF Trans. Secondary	34Ω		RTL-149				

MISCELLANEOUS

ITEM No.	PART NAME	General Electric PART No.	NOTES
M1	Tuning Cap.	RCT-068	2 Section (28-432MMF), (13-120MMF)
	Cabinet	RAU-378	Dark brown plastic
	Knob	RDK-295	Volume
	Knob	RDK-321	Tuning

CHASSIS—BOTTOM VIEW



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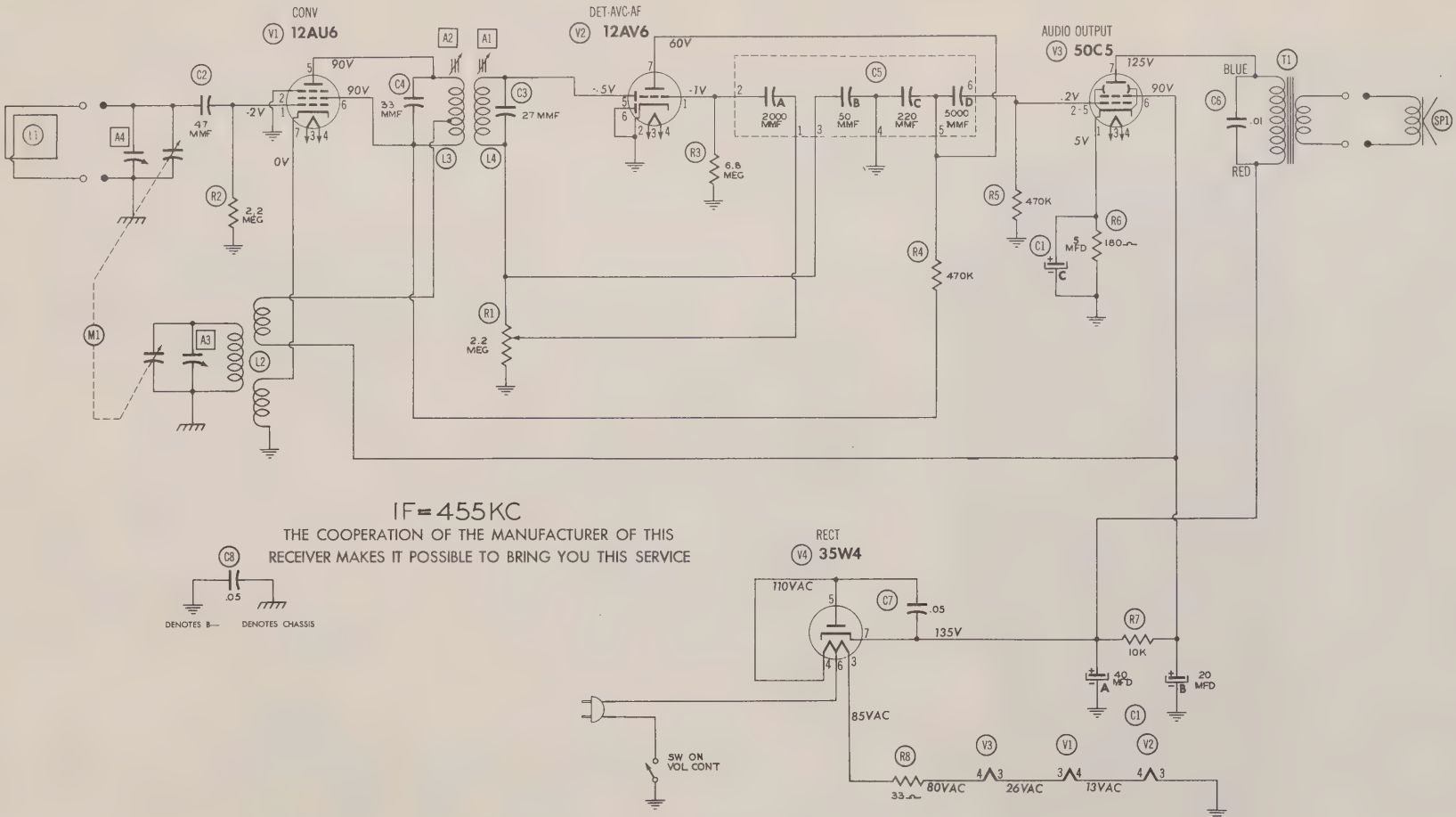

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V 1	12AU6	2.2Meg	1Ω	32Ω	16Ω	†10KΩ	†10KΩ	1Ω
V 2	12AV6	6.8Meg	0Ω	0Ω	16Ω	2.2Meg	0Ω	†480KΩ
V 3	50C5	180Ω	470KΩ	32Ω	115Ω	470KΩ	†10KΩ	†240Ω
V 4	35W4	INF	INF	150Ω	200Ω	200Ω	190Ω	100KΩ

† MEASURED FROM PIN 7 OF V4

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

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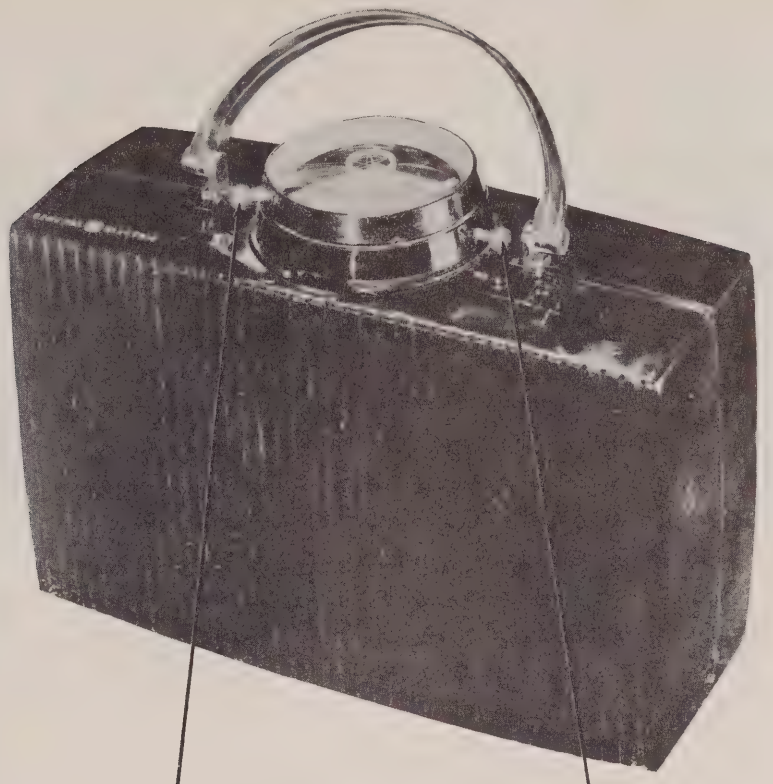
GENERAL ELECTRIC
MODELS 612, 613



GENERAL ELECTRIC
MODELS 612, 613

TRADE NAME	General Electric Models 612, 613
MANUFACTURER	General Electric Co., Electronics Dept., Electronics Park, Syracuse, N.Y.
TYPE SET	Three Power Portable AM Superheterodyne Receiver
TUBES (Four)	Types 1R5 Conv., 1T4 IF Amp., 1U5 Det.-AVC-AF Amp., 3V4 Audio Output
POWER SUPPLY	105-120 Volts AC/DC (or) 7½ Volts "A" Supply & 67½ Volts "B" Supply
RATING	.13 Amp. @ 117 Volts AC (or) 50MA @ 7½ Volts DC & 11MA @ 67½ Volts DC
TUNING RANGE—BROADCAST	540-1600 KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Use isolation transformer, if available. If not, connect a .1MFD capacitor in series with low side of signal generator and B-. Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.05MFD	High side to antenna stator lug on tuning gang. Low side to B-	455KC (400~Mod)	Tuning gang fully open	Across voice coil	A1, A2, A3, A4	Adjust for maximum output. If isolation transformer is not used, reduce dummy antenna to .001MFD to reduce hum modulation.
2.		Loop	1620KC	"	"	A5	Install receiver in cabinet. Batteries should be in their proper place. Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3.		"	1500KC	"	"	A6	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output. Repeat steps 2 and 3.

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PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA: General Electric PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RETMA BASE TYPE	NOTES
V1	Converter	1R5	1R5	7AT	
V2	IF Amp.	1T4	1T4	6AR	
V3	Det-AVC-AF Amp.	1U5	1U5	6BW	
V4	Audio Output	3V4	3V4	6BX	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: General Electric PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C1A	■60	150	RCE-151						R1465	
B	▲40	150								
C	200	20						PT412	4TM-S2	
C2	.02	400	UCC-026	P488-02	DF-203	CUB4S2		UC-5447	5GA-Q47	
C3	47		RCW-3075	BPD-000047	D6-470	G033	GP1K-470	DC-511	5HK-S1	
C4	10000		RCW-3054	BPD-01	DD-103	K082	811-01			
C5	.33	100	RCN-070			PM4P33				
C6A	300			SI300	D6-301	G055	GP2K-301	UC-533	5GA-T3	
B	2000			BPD-002	DD-202	K072	811-002	DC-522	5HK-D2	
C	220		♦RCW-3015	SI220	D6-221	G051	GP2K-221	UC-5322	5GA-T22	
C D	5000			BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
E	4000			BPD-004	DD-402	K078	811-004	DC-524	5HK-D4	
C7	2000		RCW-3018	BPD-002	DD-202	K072	811-002	DC-522	5HK-D2	
C8	.047	600	RCN-053	489ZX-047		CUB6S47		PT4147	6TM-S47	
C9	.05	400	UCC-045	489ZX-05		CUB4S5		PT415	4TM-S5	

♦ Items C6A, C6B, C6C, C6D and C6E are combined in one unit.

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: General Electric PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	500KΩ	½	RRC-206	Q13-133	AG-60-Z	BSK-60-S	U-48	Volume
B	Shaft		Not Req.	Not Req.	FS-3	Not Req.	Not Req.	Attach to R1A
C	Switch		Not Req.	76-2	SWB-2	Not Req.	US-27	Attach to R1A

RESISTORS

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: General Electric PART No.	REPLACEMENT DATA: IRC PART No.	NOTES
R2	100KΩ	½	URD-097	BTS-100K	
R3	4300Ω	1		BTA-4300	Note 1
R4	3.3Meg	½	URD-133	BTS-3.3Meg	
R5	10Meg	½		BTS-10Meg	
R6	3.3Meg	½	URD-133	BTS-3.3Meg	
R7	470KΩ	½		BTS-470K	
R8	3.3Meg	½	URD-133	BTS-3.3Meg	

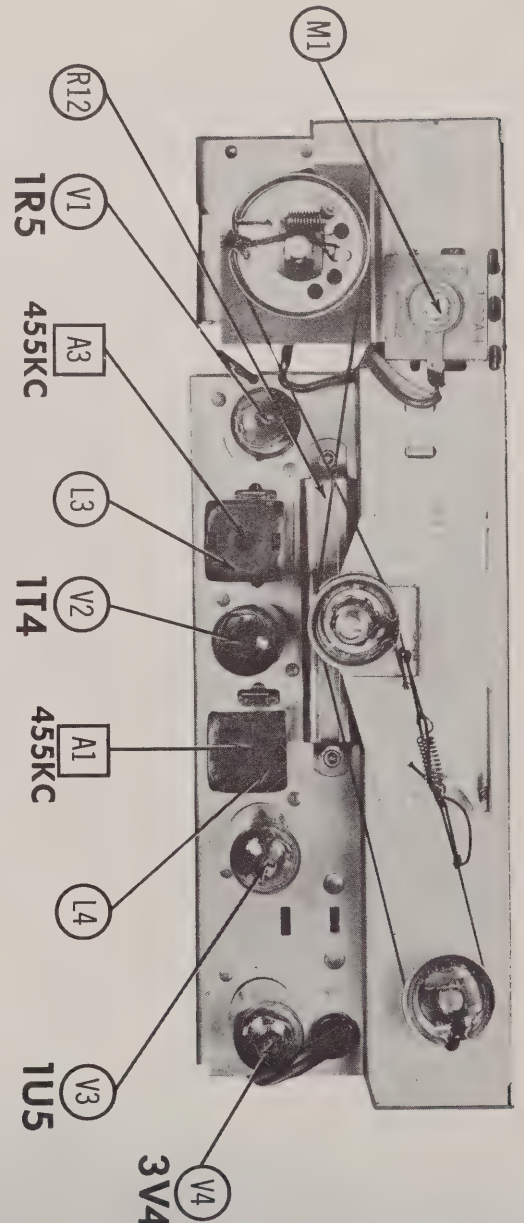
ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: General Electric PART No.	REPLACEMENT DATA: IRC PART No.	NOTES
R9	6.8Meg	½	URD-141	BTS-6.8Meg	
R10	1500Ω	½	URD-053	BTS-1500	
R11	1500Ω	½	URD-053	BTS-1500	
R12	2300Ω	10	RRW-042		
R13	2700Ω	1	URE-059	BTA-2700	
R14	91Ω	2			Note 2

Note 1. Some models may use a 4700Ω resistor in this application.
Note 2. Some models may use a 100Ω resistor in this application.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	RATING: IMPEDANCE PRI.	RATING: IMPEDANCE SEC.	RATING: DC RES. PRI.	RATING: DC RES. SEC.	REPLACEMENT DATA: General Electric PART No.	STANCOR PART No.	MERIT PART No.	Halldorson PART No.	TRIAD PART No.	NOTES
T1	9.8KΩ	3.1Ω	530Ω	.36Ω	RTO-133	A-3329	A-2998	Z1110		

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA			NOTES
	SIZE	FIELD	V. C. IMP.	General Electric PART No.	JENSEN PART No.	QUAM PART No.	
SP1	4"	PM	3.1Ω	S-400D7	ST-113 Mod P4-X	4A1	

COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	General Electric PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	Ant. Coil	.4Ω		RLL-052				
L2	Osc. Coil	2.2Ω	7Ω	RLC-101	14-1074		70-Osc.	
L3	Input IF	20Ω	20Ω	RTL-052	16-6758	BC-352	12-C1	
L4	Output IF	20Ω	20Ω	RTL-052	16-6758	BC-353	12-C2	

SELENIUM RECTIFIER

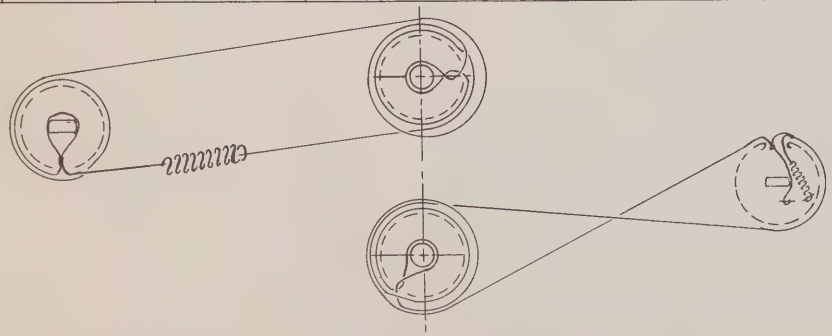
ITEM No.	RATING	REPLACEMENT DATA					NOTES
	CURRENT	General Electric PART No.	SELETRON PART No.	FEDERAL PART No.	MALLORY PART No.	SARKES TARZIAN PART No.	
M1	.065A	REX-005	5M4	1003	6S75	75	

BATTERIES

ITEM No.	VOLTAGE	General Electric PART No.	REPLACEMENT DATA						INSTALLATION NOTES
			EVEREADY			BURGESS			
			"A"	"B"	"A-B"	"A"	"B"	"A-B"	
M2	7½V "A"		717			C5			
M3	67½V "B"			467			XX45		

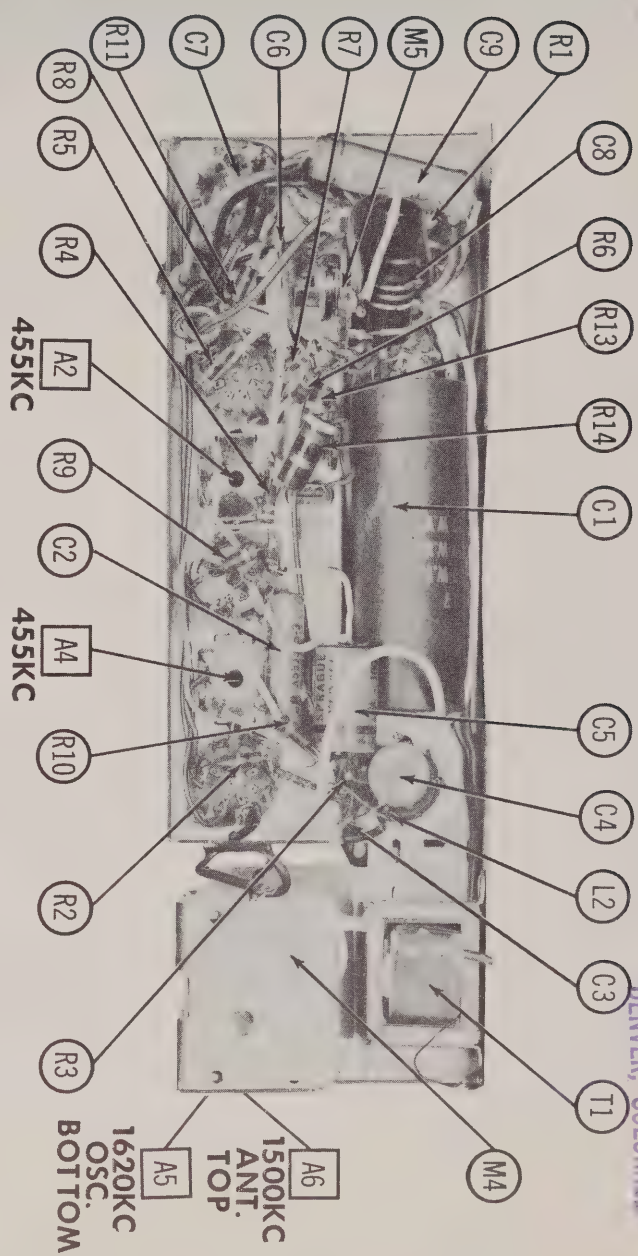
MISCELLANEOUS

ITEM No.	PART NAME	General Electric PART No.	NOTES
M4	Tuning Cap.	RCT-067	2 section (30-330MMF, 22-155MMF)
M5	Switch	RSW-088	Power changeover
	Cabinet	RAC-129	Front Model 612 (black)
	Cabinet	RAC-130	Front Model 613 (red)
	Cabinet	RAB-209	Back Model 612 (black)
	Cabinet	RAB-210	Back Model 613 (red)
	Knob	RDK-311	Off/On/Volume Model 612 (black)
	Knob	RDK-312	Off/On/Volume Model 613 (red)
	Knob	RDK-313	Tuning Model 612 (black)
	Knob	RDK-314	Tuning Model 613 (red)
	Handle	RHY-046	Metal - chrome finish (2 used)
	Dial Scale	RDS-122	Metal - circular



DIAL CORD STRINGING

CHASSIS—BOTTOM VIEW



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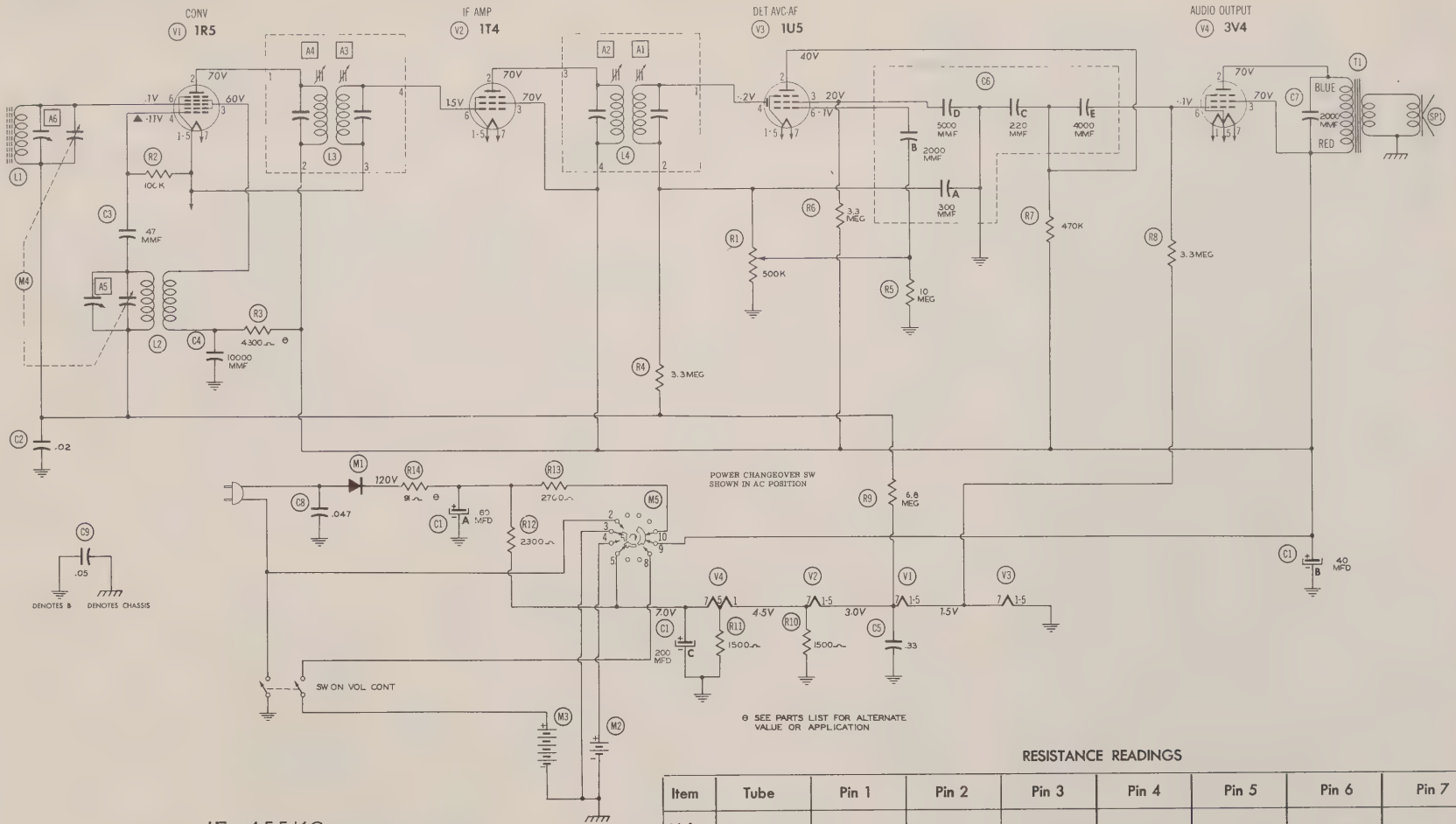

θ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

IF=455KC

THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V 1	1R5	*	†2.8KΩ	†7.1KΩ	100KΩ	*	2.2Meg	*
V 2	1T4	*	†2.8KΩ	†2.8KΩ	2.2Meg	*	#20Ω	*
V 3	1U5	*	†470KΩ	†3.3Meg	500KΩ	INF	10Meg	*
V 4	3V4	*	†3.3KΩ	†2.8KΩ	INF	*	3.3Meg	*

† MEASURED FROM OUTPUT OF M1
* DO NOT USE OHMMETER TO MEASURE FILAMENT RESISTANCE
# MEASURED FROM PIN 1 OF V1 - DO NOT MEASURE TO GROUND

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

PROPERTY OF
L F BLANKENSHIP
3934 MEADE ST
DENVER, COLORADO

McINTOSH
MODEL C104

TRADE NAME	McIntosh Model C104
MANUFACTURER	McIntosh Laboratory, Inc., 320 Water St., Binghamton, N.Y.
TYPE SET	Five Channel Audio Pre-Amplifier
TUBES (Three)	Types 12AX7 AF Amp.-Cathode Follower
POWER SUPPLY REQUIREMENTS	280-320 Volts DC & 6.3 volts (Filament)

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

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TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		Mc INTOSH PART No.	STANDARD REPLACEMENT		
V1	AF Amplifier-Cathode Follower	12AX7	12AX7	9A	
V2	AF Amplifier-Cathode Follower	12AX7	12AX7	9A	
V3	AF Amplifier-Cathode Follower	12AX7	12AX7	9A	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

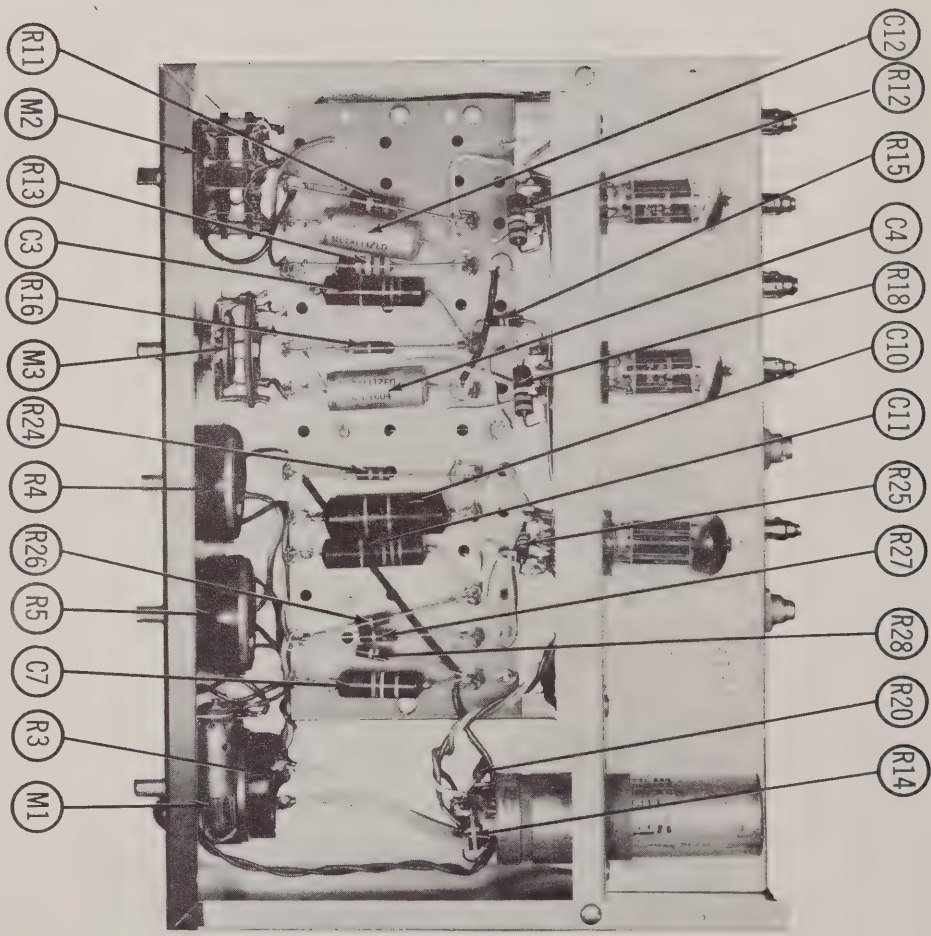
ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP.	VOLT	McINTOSH PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C1A	15	300						FP343.4		
B	▲15	350								
C	■20	400								
C2	.033	400		P488-033				PT4133		
C3	.033	400		P488-033				PT4133		
C4	.5	200		289ZX-5		MTM2P5				Note 1
C5	.22	400		P488-22		PTE4P22			4TM-P22	
C6	.001	400								
C7	.01	400								
C8	.0022	400								
C9	.022	400								
C10	.1	400		P488-1	DF-104	PTE4P1		PT401	4TM-P1	
C11	.033	400								
C12	.5	200		289ZX-5		MTM2P5				
C13	.0047	400								Note 1
C14	.01	400								Note 1
C15	.001	400								
C16	.0022	400								
C17	.01	400		689ZX-01		PJ4S1		PT411	4TM-S1	
C18	.01	400		689ZX-01		PJ4S1		PT411	4TM-S1	

Note 1. Not used in all Models.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	Mc INTOSH PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	
R1A	100KΩ	½	R011-128	Q11-128	AG-49-S	AB-40	SU-41	Lever adjustment #1
B	Shaft		Not Req.	Not Req.	FKS-1/4	AK-1	Not Req.	Attach to R1A
R2A	100KΩ	½	R011-128	Q11-128	AG-49-S	AB-40	SU-41	Level adjustment #2
B	Shaft		Not Req.	Not Req.	FKS-1/4	AK-1	Not Req.	Attach to R2A
R3A	250KΩ	½		Q13-130		A-127		Volume & SW
B	Switch			76-1		K-10		Attach to R3A
R4	1Meg	½		Q13-137		A-132		Bass
R5	250KΩ	½	1-010-2117	Q13-130		A-127		Treble

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

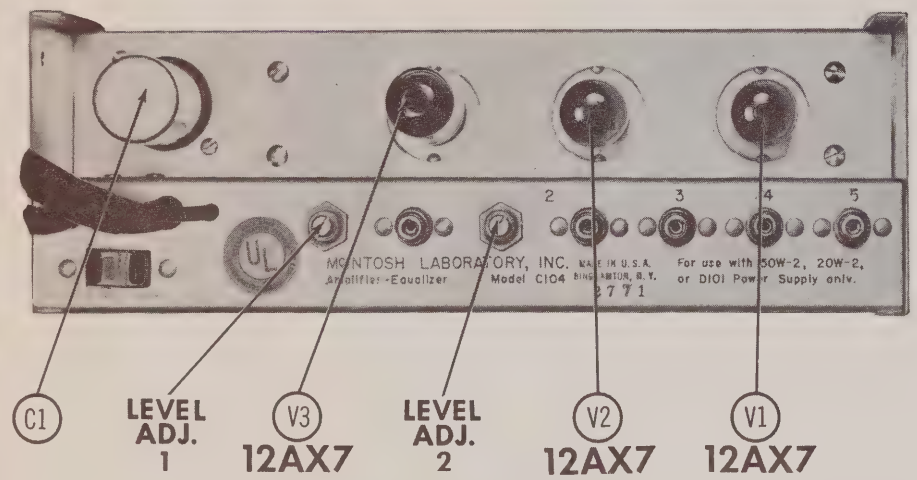
ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA Mc INTOSH PART No.	REPLACEMENT DATA IRC PART No.	NOTES
~~R6~~	100KΩ	1/2		BTS-100K	
R7	10KΩ	1/2		BTS-10K	Note 1
R8	22KΩ	1/2		BTS-22K	Note 1
R9	47KΩ	1/2		BTS-47K	
R10	1.2Meg	1/2		BTS-1.2Meg	
R11	1800Ω	1		BTA-1800	
R12	330KΩ	1		BTA-330K	
R13	330KΩ	1		BTA-330K	
R14	100KΩ	1/2		BTS-100K	
R15	100KΩ	1/2		BTS-100K	
R16	1.2Meg	1/2		BTS-1.2Meg	
R17	1800Ω	1		BTA-1800	
R18	330KΩ	1		BTA-330K	
R19	330KΩ	1		BTA-330K	
R20	56KΩ	1/2		BTS-56K	
R21	30KΩ 5%	1/2		BTS-30K 5%	
R22	100KΩ	1/2		BTS-100K	

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA Mc INTOSH PART No.	REPLACEMENT DATA IRC PART No.	NOTES
R23	10KΩ	1/2		BTS-10K	
R24	1800Ω	1/2		BTS-1800	
R25	330KΩ	1/2		BTS-330K	
R26	1.2Meg	1/2		BTS-1.2Meg	
R27	1800Ω	1/2		BTS-1800	
R28	100KΩ	1/2		BTS-100K	
R29	12KΩ	2		BTB-12K	
R30	1Ω	10			Note 3
R31	2Ω	10		1 3/4A-2	Note 4
R32	10Meg	1/2		BTS-10Meg	Note 3
R33	22Meg	1/2		BTS-22Meg	Note 2
R34	22Meg	1/2		BTS-22Meg	Note 2
R35	10Meg	1/2		BTS-10Meg	Note 3
R36	22Meg	1/2		BTS-22Meg	Note 2
R37	22Meg	1/2		BTS-22Meg	Note 2
R38	120KΩ	1/2		BTS-120K	

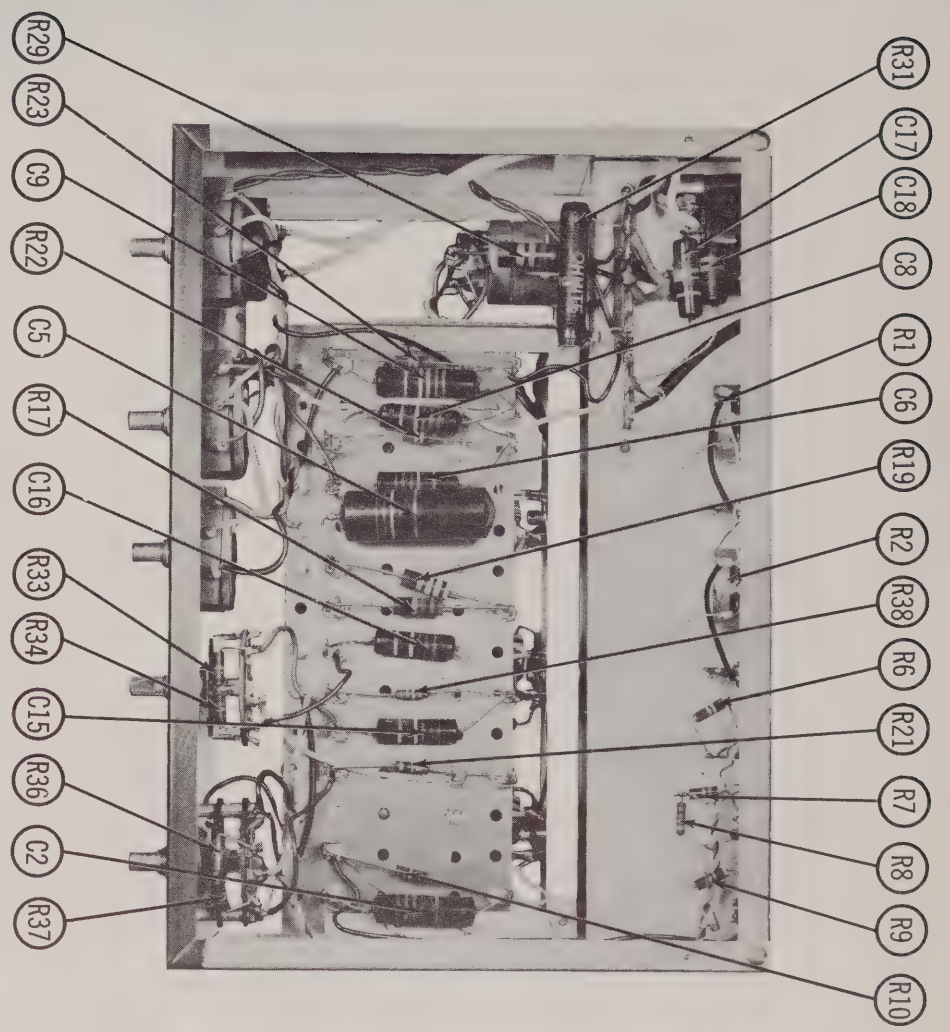
Note 1. Some models use a single 27KΩ resistor in this application.
Note 2. Some models use a single 44Meg resistor in this application.
Note 3. Not used in all models.
Note 4. Some models use a 1Ω (10 watt) resistor in this application.

MISCELLANEOUS

ITEM No.	PART NAME	McINTOSH PART No.	NOTES
M1	Dial Light		Type #44
M2	Switch		Input Selector
M3	Switch		Turn-over Selector

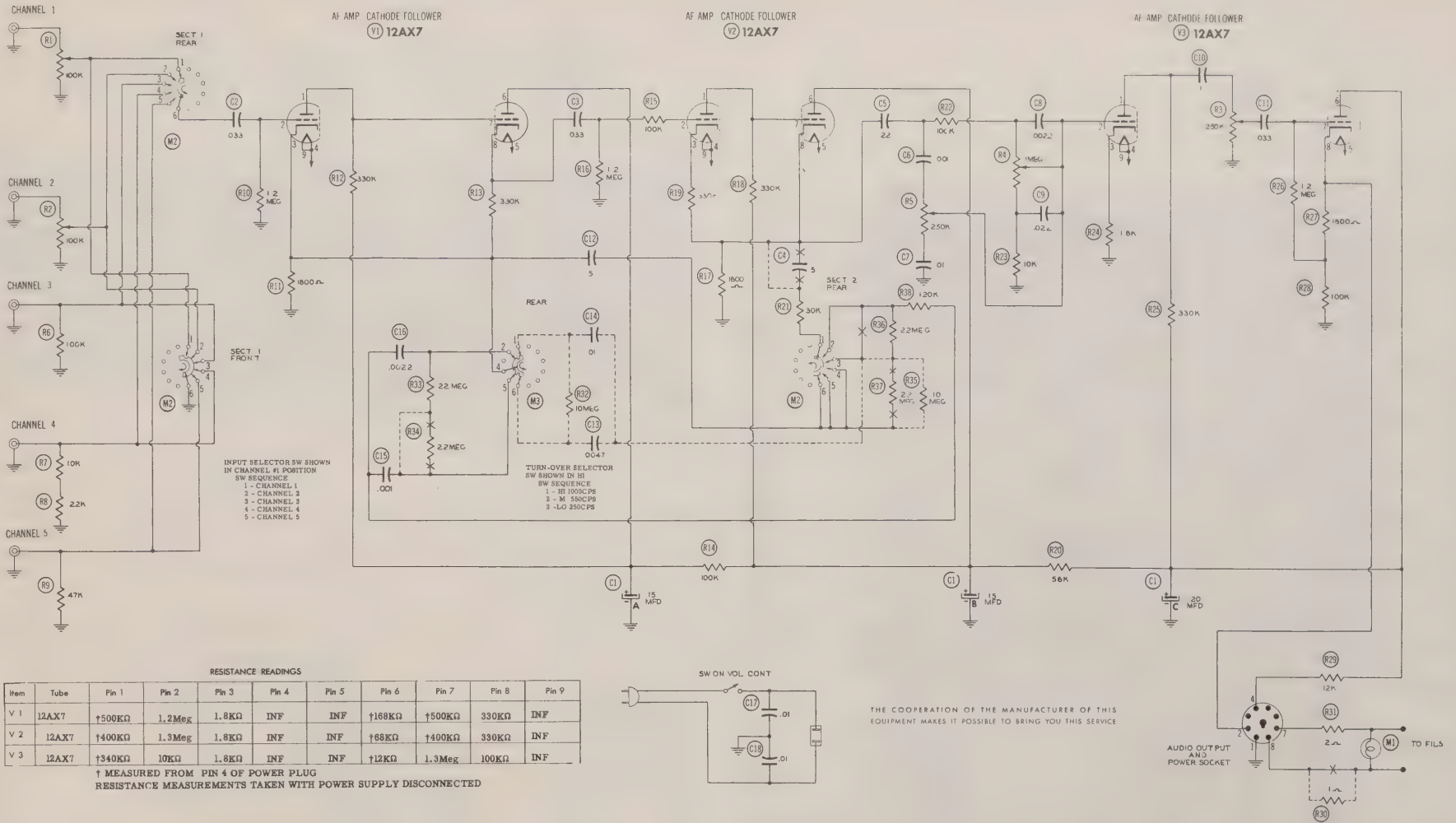


CHASSIS—BOTTOM VIEW



SET 231 FOLDER 10

McINTOSH MODEL C104



RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	12AX7	†500KΩ	1.2Meg	1.8KΩ	INF	INF	†168KΩ	†500KΩ	330KΩ	INF
V 2	12AX7	†400KΩ	1.3Meg	1.8KΩ	INF	INF	†68KΩ	†400KΩ	330KΩ	INF
V 3	12AX7	†340KΩ	10KΩ	1.8KΩ	INF	INF	†12KΩ	1.3Meg	100KΩ	INF

† MEASURED FROM PIN 4 OF POWER PLUG
RESISTANCE MEASUREMENTS TAKEN WITH POWER SUPPLY DISCONNECTED

THE COOPERATION OF THE MANUFACTURER OF THIS EQUIPMENT MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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DENVER, COLORADO

PACKARD BELL
MODEL 531

TRADE NAME	Packard-Bell Model 531
MANUFACTURER	Packard-Bell Co., Service Div., 11th. & Hope Sts., Los Angeles 15, Calif.
TYPE SET	AC-DC Operated AM Superheterodyne Receiver
TUBES (Five)	Types 12BE6 Conv., 12BA6 IF Amp., 12AV6 Det.-AVC-AF Amp., 50C5 Audio Output, 35W4 Rectifier
POWER SUPPLY	110-120 Volts AC-DC RATING .24 Amp. @ 117 Volts AC
TUNING RANGE—BROADCAST	540-1620KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Use isolation transformer, if available. If not, connect a .1MFD capacitor in series with low side of signal generator and B-. Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.01MFD	High side to pin (grid) of 12BE6 (V1). Low side to B-.	455KC (400~Mod)	Tuning gang fully open	Across voice coil	A1, A2, A3, A4	Adjust for maximum output. If isolation transformer is not used, reduce dummy antenna to .001MFD to reduce hum modulation.
2.		Loop	1620KC	"	"	A5	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3.		"	1500KC	Tune to 1500KC signal	"	A6	"

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PARTS LIST AND DESCRIPTIONS

PACKARD-BELL MODEL 531

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		Packard-Bell PART No.	STANDARD REPLACEMENT		
V1	Converter	12BE6	12BE6	7CH	
V2	IF Amp.	12BA6	12BA6	7BK	
V3	Det.-AVC-AF Amp	12AV6	12AV6	7BT	
V4	Audio Output	50C5	50C5	7CV	
V5	Rectifier	35W4	35W4	5BQ	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP.	VOLT	Packard-Bell PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C1A	50	150	24073	PRS150/50-		BBRD5315		TCD-49	TVA-2453	Yellow
B	50	150		50						Red
C2	.047	200	23017	P288-047	DF-503	PJ2S47		PT4147	2TM-S47	
C3	220		23915	SI220	D6-221		GP1K-221	UC-5322	5GA-T22	
C4	220		23915	SI220	D6-221		GP1K-221	UC-5322	5GA-T22	
C5	5000		23931	BPD-005	DD-502	TM5D5	811-005	DC-525	5HK-D5	
C6	470		23916	SI470	D6-471		GP1K-471	UC-5347	5GA-T47	
C7	10000		23939	BPD-01	DD-103	TM5S1	811-01	DC-511	5HK-S1	
C8	10000		23939	BPD-01	DD-103	TM5S1	811-01	DC-511	5HK-S1	
C9	.05	200	23017	P288-05		PJ2S5		PT415	2TM-S5	
C10	.15	200	23028	P288-.15		PJ2P15		PT4015	2TM-P15	

CONTROLS

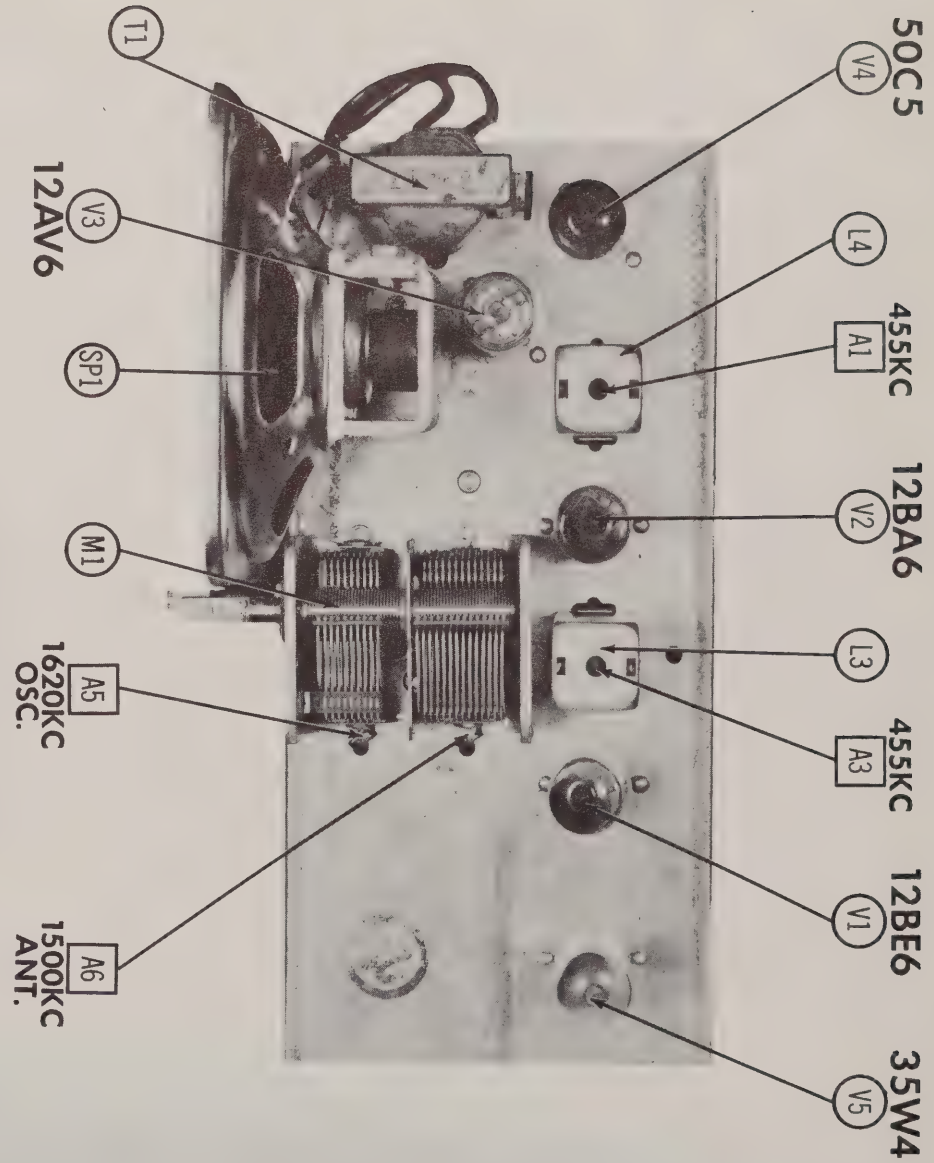
ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	Packard Bell PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	
R1A	500K	½	PB-25027	Q13-133	AG-60-Z	BSK-60-S	U-48	Volume
B	Shaft		Not Req.	Not Req.	KSS-3	Not Req.	Not Req.	Attach to R1A
C	Switch		Not Req.	76-1	SWB	Not Req.	Not Req.	Attach to R1A

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	Packard Bell PART No.	IRC PART No.	
R2	22KΩ	½	73041	BTS-22K	
R3	220Ω	½	73017	BTS-220	
R4	2.2Meg	½	73165	BTS-2.2Meg	
R5	4.7Meg	½	73169	BTS-4.7Meg	
R6	470KΩ	½	73157	BTS-470K	

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	Packard Bell PART No.	IRC PART No.	
R7	470KΩ	½	73157	BTS-470K	
R8	150Ω	½	73015	BTS-150	
R9	68Ω	½	73011	BTS-68	
R10	1000Ω	1	73225	BTA-1000	

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA					NOTES
	IMPEDANCE		DC RES.		Packard-Bell PART No.	STANCOR PART No.	MERIT PART No.	Halldorson PART No.	TRIAD PART No.	
	PRI.	SEC.	PRI.	SEC.						
T1	2.3KΩ	3.3Ω	135Ω	.7Ω	89419	A-3332	A-3025	Z1101	S-2X ①	① Drill one new mounting hole.

SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA			NOTES
	SIZE	FIELD	V. C. IMP.	Packard-Bell PART No.	JENSEN PART No.	QUAM PART No.	
SP1	4"	PM	3.3Ω	83008B 83010 ①	ST-113 Mod. P4-X	4A1	① Alternate 4" PM speaker

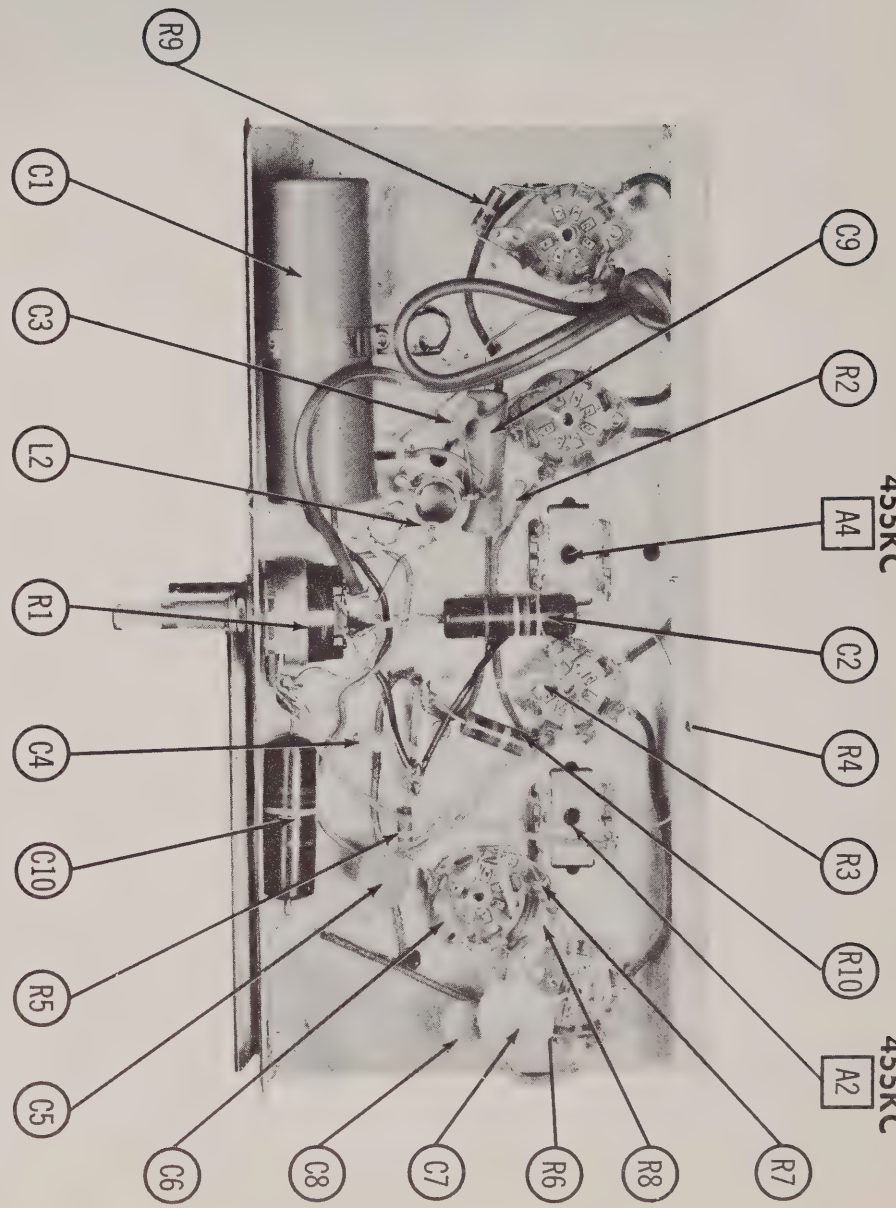
COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	Packard-Bell PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	Loop Ant.	3.2Ω		29331				
L2	Osc. Coil	.8Ω	5.5Ω	29220	14-1074		70-Osc.	
L3	Input IF	20Ω	20Ω	29066	16-6758	BC-352	12-C1	
L4	Output IF	15Ω	15Ω	29067	16-6758	BC-353	12-C2	

MISCELLANEOUS

ITEM No.	PART NAME	Packard-Bell PART No.	NOTES
M1	Tuning Cap.	23528	2 gang (37-488MMF, 20-192MMF)
	Cabinet	531	Specify color
	Knob	52083AL	Volume, Specify color, ivory-pink-blue
	Knob	52082AL	Tuning, Specify color, ivory-pink-blue
	Knob	52083AB	Volume, Brown
	Knob	52082AB	Tuning, Brown
	Dial	30131	

CHASSIS—BOTTOM VIEW



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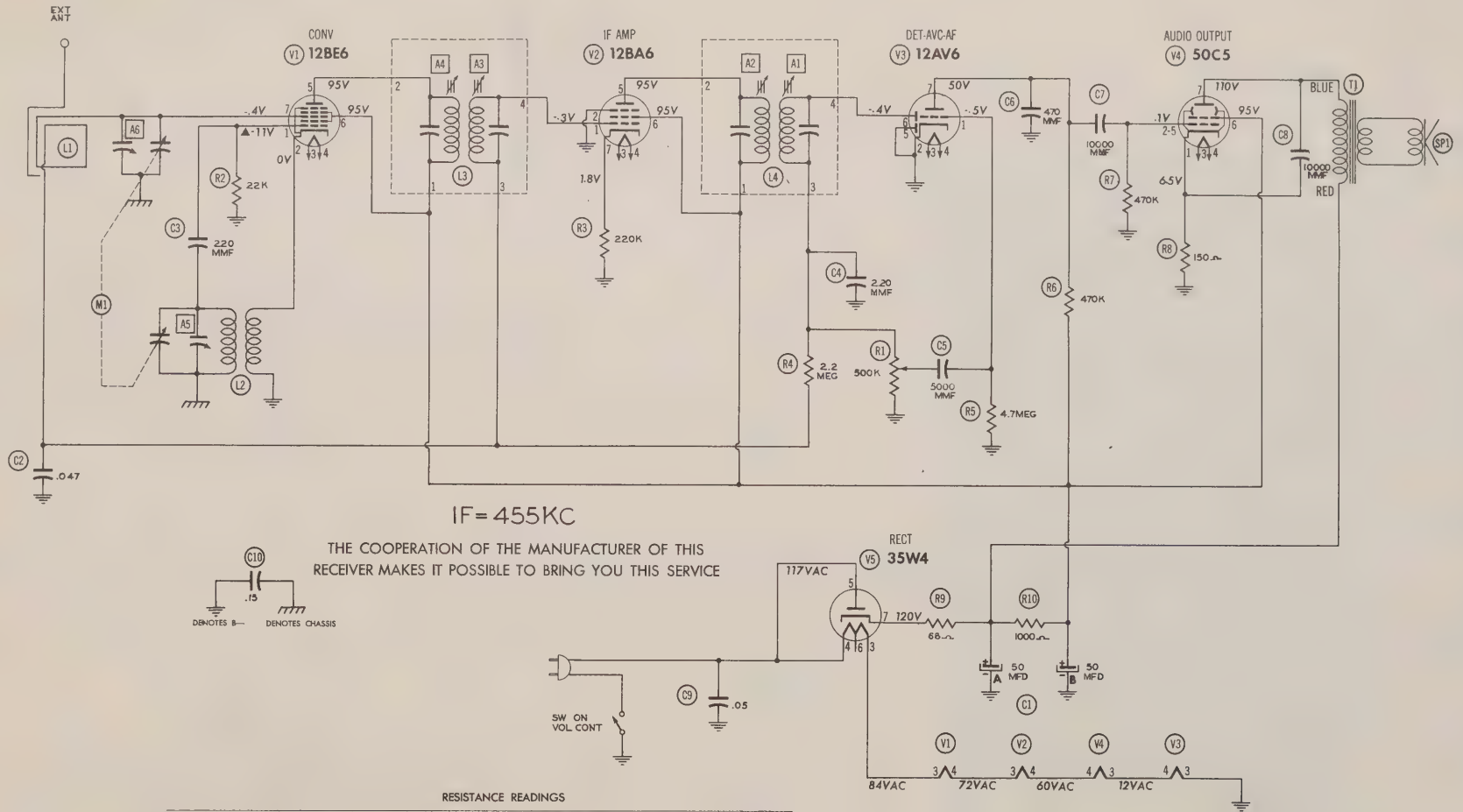

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V 1	12BE6	22KΩ	5.5Ω	140Ω	120Ω	†1KΩ	†1KΩ	2.7Meg
V 2	12BA6	2.7Meg	0Ω	120Ω	100Ω	†1KΩ	†1KΩ	220Ω
V 3	12AV6	4.7Meg	0Ω	0Ω	18Ω	0Ω	500KΩ	†470KΩ
V 4	50C5	150Ω	470KΩ	18Ω	100Ω	470KΩ	†1KΩ	†200Ω
V 5	35W4	†68Ω	INF	140Ω	180Ω	180Ω	INF	100KΩ

† MEASURED FROM PIN 7 OF V5

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231-11

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

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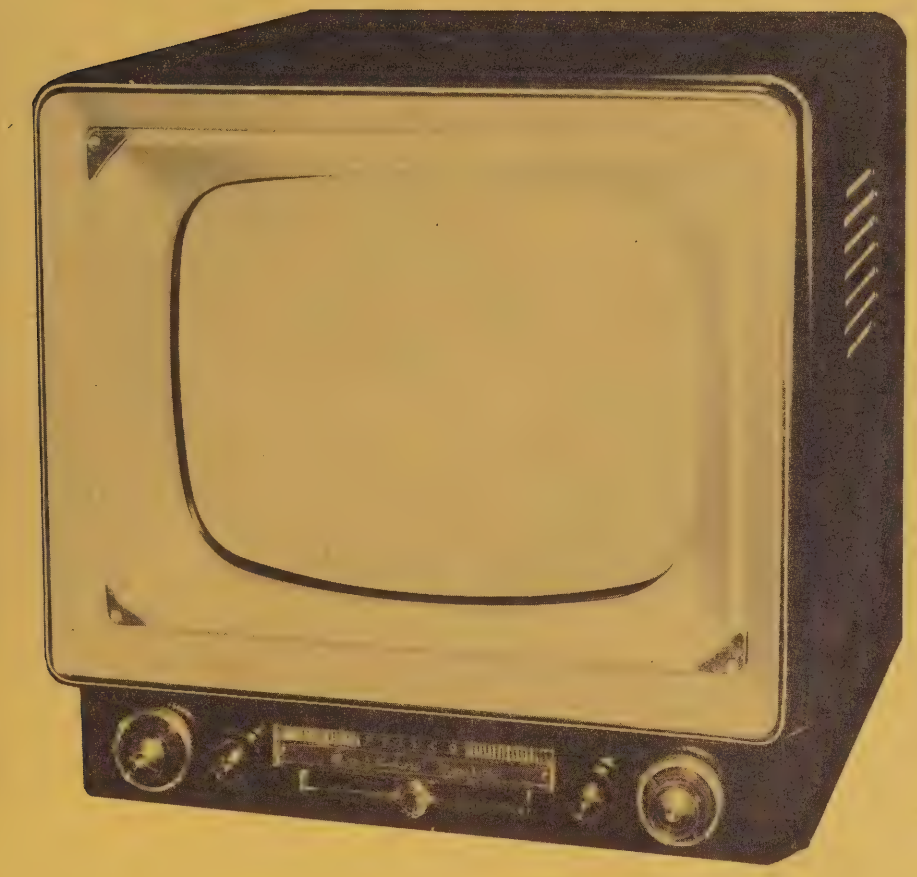

MODEL 18B3002

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PHILCO MODELS 18B3002, 18BU3002, 18B3102, L, 18BU3102, L, 22B4002, L, 22BU4002, 22B4004, 22BU4004, 22B4102, L, 22BU4102, L, 22B4106, 22BU4106, 22B4109HM, 22BU4109HM, 22B4150, 22B4302, 22BU4302, 22B4304, 22BU4304, 22B4306, L, 22BU4306, L, 22B4307HM, 22BU4307HM (Ch. R-191, R-191U, D-191)

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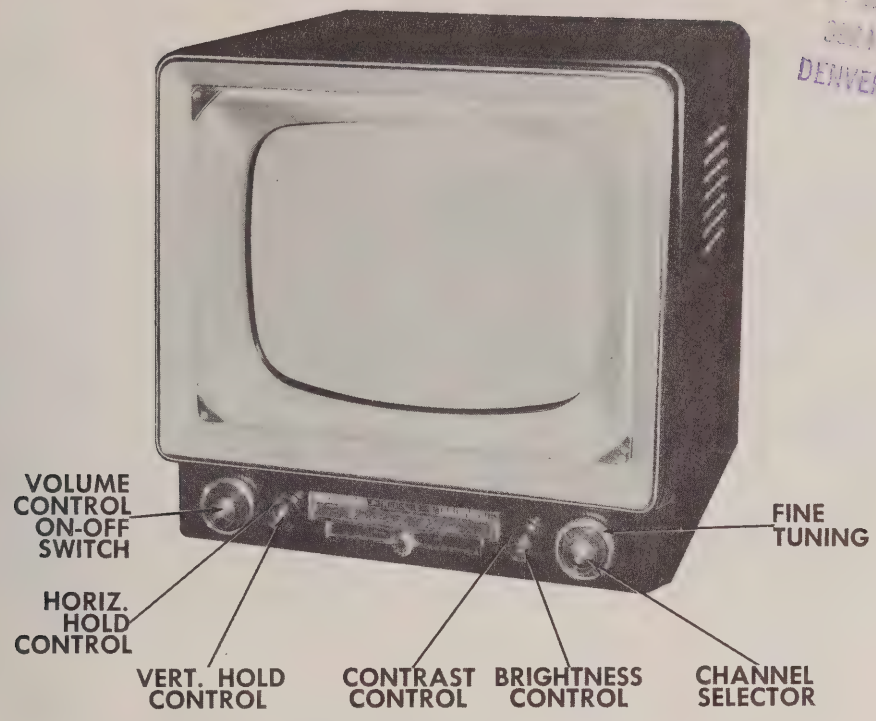

PHILCO MODEL 18B3002

TRADE NAME	Philco	MODELS	CHASSIS	CODE
		18B3002, 18B3102, L	R-191 & D-191	140
		22B4002, L, 22B4004, 22B4102, L	R-191 & D-191	140
		22B4106, 22B4109HM, 22B4150	R-191 & D-191	140
		22B4302, 22B4304 22B4306, L, 22B4307HM	R-191 & D-191	140
		18BU3002, 18BU3102, L	R-191U & D-191	140
		22BU4002, 22BU4004, 22BU4102, L, 22BU4106, 22BU4109HM	R-191U & D-191	140
		22BU4302, 22BU4304, 22BU4306, L, 22BU4307HM	R-191U & D-191	140

MANUFACTURER	Philco Corp., Tioga &'C" Sts., Philadelphia, Pa.
TYPE SET	Television Receiver
TUBES	Nineteen (VHF only) Twenty-one (UHF only)
POWER SUPPLY	110-120 Volts AC-60 Cycle RATING 1.45 Amp. @ 117 Volts AC
TUNING RANGE -	Channels 2 thru 13 VHF, 14 thru 83UHF, Video IF 45.75MC, Sound IF 41.25MC (Intercarrier)

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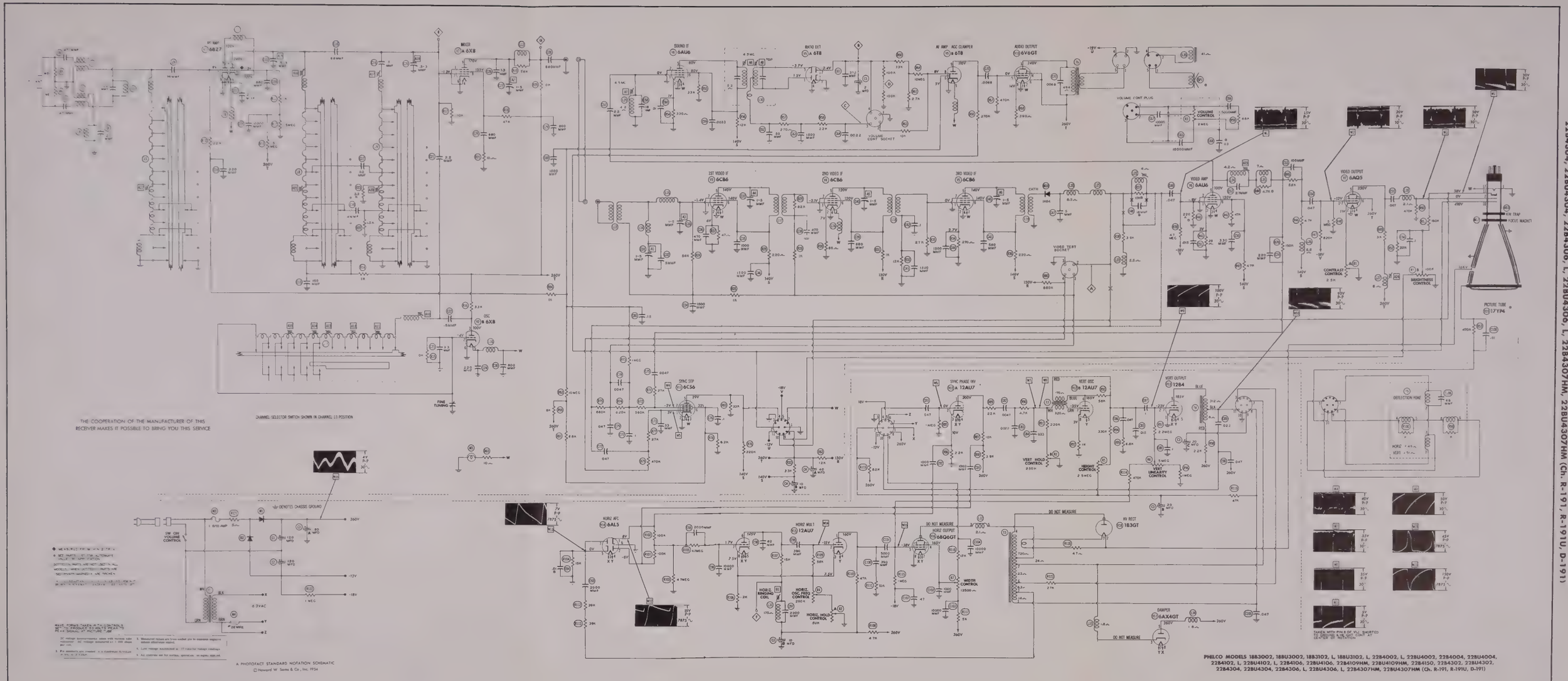
THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE
CHANNEL SELECTOR SWITCH SHOWN IN CHANNEL 13 POSITION
DENOTES CHASSIS GROUND
DO NOT MEASURE
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PHILCO MODELS 18B3002, 18BU3002, 18B3102, L, 18BU3102, L, 22B4002, L, 22BU4002, 22B4004, 22BU4004, 22B4102, L, 22BU4102, L, 22B4106, 22BU4106, 22B4109HM, 22BU4109HM, 22B4150, 22B4302, 22BU4302, 22B4304, 22BU4304, 22B4306, L, 22BU4306, L, 22B4307HM, 22BU4307HM (Ch. R-191, R-191U, D-191)

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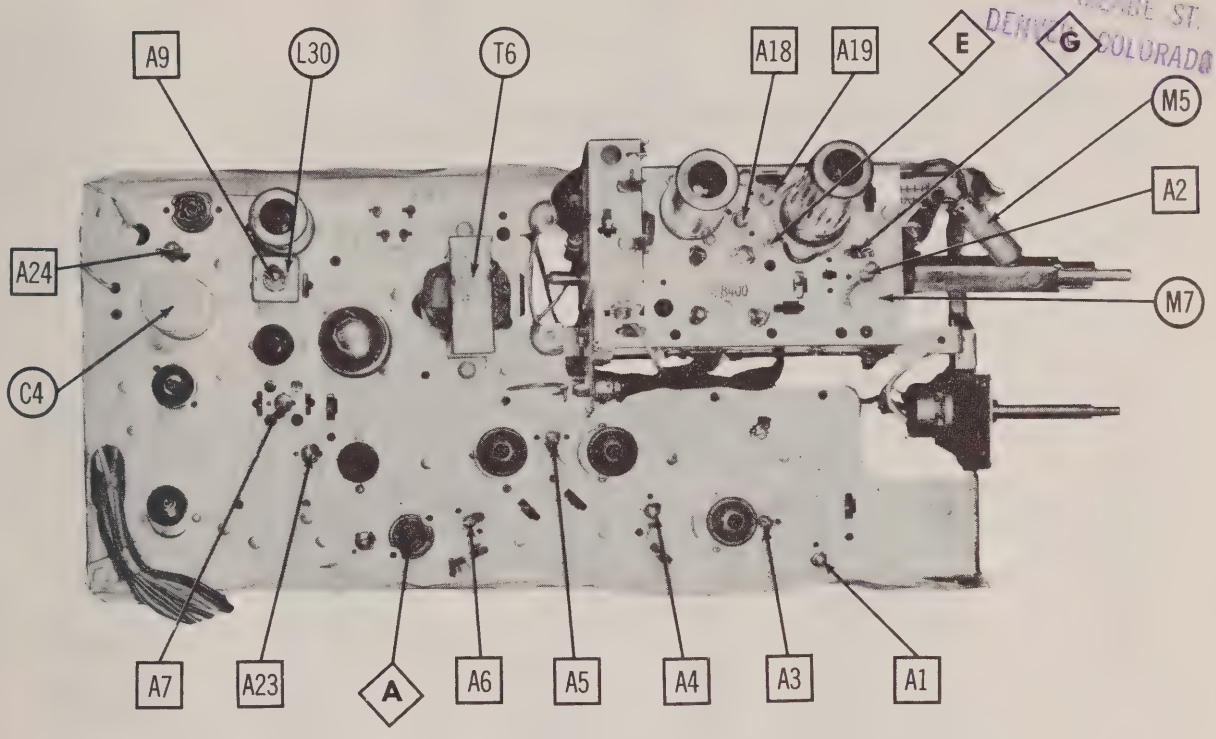
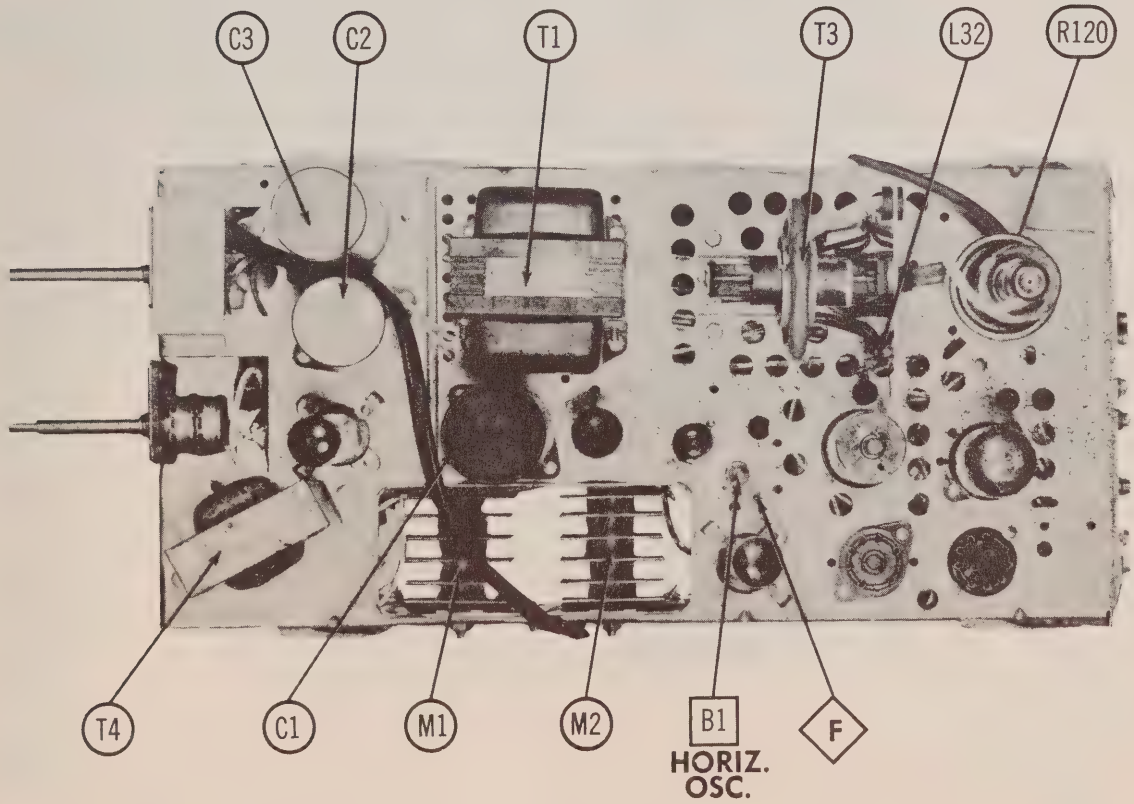
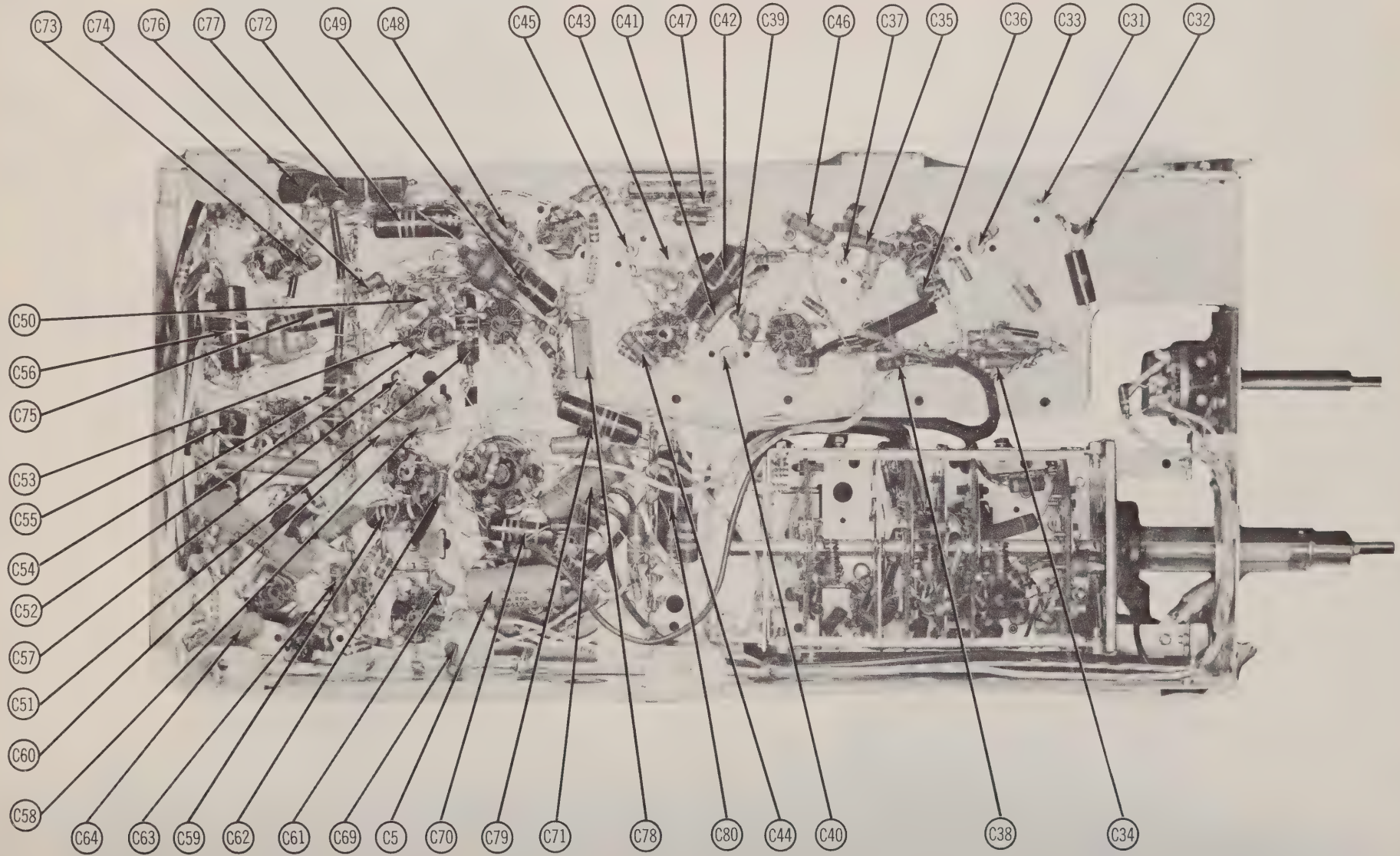


RF-IF CHASSIS-TOP VIEW



SWEEP CHASSIS-TOP VIEW

For tube location see tube placement chart page 5



RF-IF CHASSIS-BOTTOM VIEW-CAPACITOR IDENTIFICATION

TUBE PLACEMENT CHART

TOP VIEW

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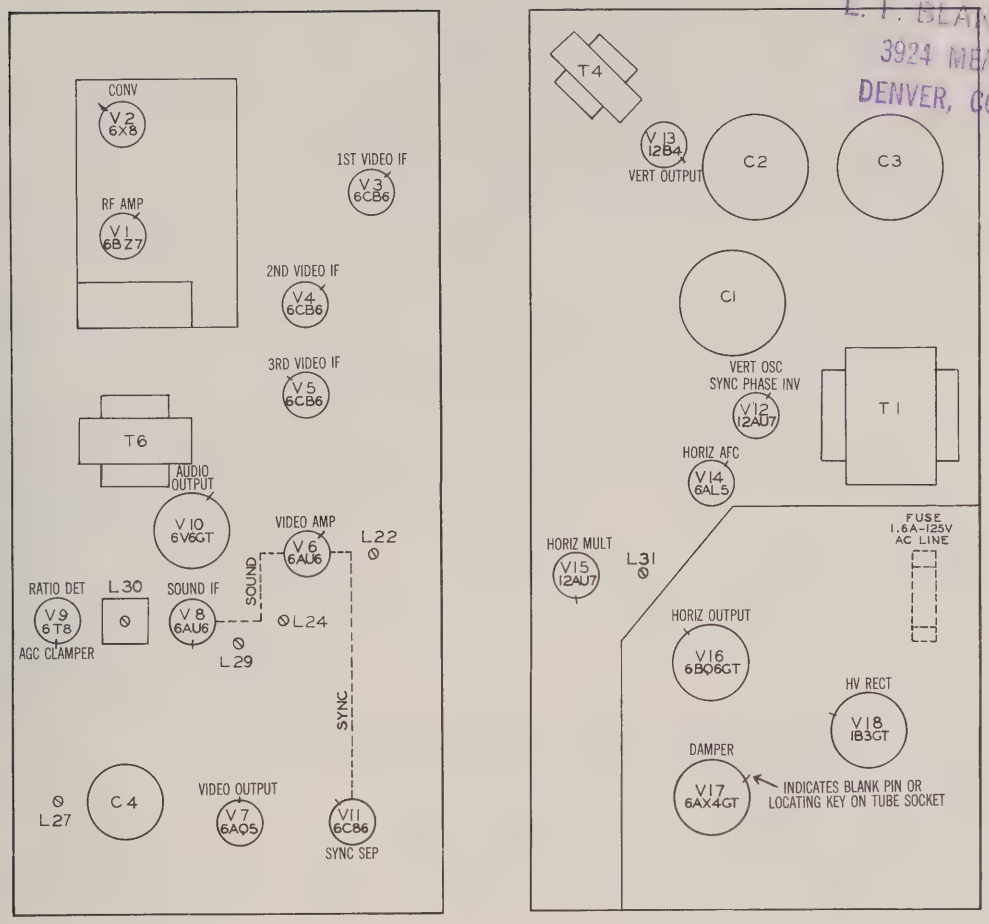

TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce the indicated symptoms. Refer to tube placement chart for location and type of tube.

POWER SUPPLY FAILURE
No raster, no sound - Selenium Rectifier (M1 & M2), Fuse (M3)

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster - V2, V3, V4, V5, V6
No pic, no sound, has snow - V1, V2, V3
No pic, has sound, has raster - V6, V7, V19
Has pic, no sound - V8, V9, V10
Overloaded picture - V9

SYNC FAILURE
No vert. sync - V12
No horiz. sync - V12, V14, V15
No vert. or horiz. sync - V11, V12

SWEEP FAILURE
No raster, has sound - V15, V16, V17, V18, V19
No vertical deflection - V12, V13
Poor vert. linearity or foldover - V12, V13
Poor horiz. linearity or foldover - V15, V16, V17
Narrow picture - V15, V16, V17, V18, M1, M2
Vert. off freq. - V12
Horiz. off freq. - V12, V14, V15

PHILCO MODELS 18B3002, 18BU3002, 18B3102, L, 18BU3102, L, 22B4002, L, 22BU4002, 22B4004, 22BU4004, 22B4102, L, 22BU4102, L, 22B4106, 22BU4106, 22B4109HM, 22BU4109HM, 22B4150, 22B4302, 22BU4302, 22B4304, 22BU4304, 22B4306, L, 22BU4306, L, 22B4307HM, 22BU4307HM (Ch. R-191, R-191U, D-191)

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

The high voltage lead should be securely taped and kept away from the chassis.
Use an isolation transformer to protect the test equipment.

VIDEO IF ALIGNMENT

Set the contrast and brightness controls at maximum counter clockwise rotation.
Connect the potentiometer arm of a 15 Volt bias supply (Fig. 1) through a 10KΩ resistor to pin 1 of the video test jack. Connect the positive side of bias supply to chassis. Set potentiometer arm for -6 Volts at pin 1 of video and AGC test jack. The IF shield must be in place during alignment.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50Ω.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	Direct	High side to an ungrounded tube shield floating over converter tube (V2). Low side to chassis.	Not used	47.25MC (400∿Mod)	4	Vert. Amp. thru 15KΩ to point (A) (Pin 2 or Video & AGC testjack) Low side to chassis.	A1	Preset A2 counter clockwise for minimum capacitance. Adjust A1 for MINIMUM 400∿ indication on scope. Use sufficient signal to obtain usable pattern on scope.
2.	"	"	"	45.7MC	"	"	A2	Adjust for maximum 400∿ indication on scope.
3.	"	"	"	42.6MC	"	"	A3	"
4.	"	"	"	45.0MC	"	"	A4	"
5.	"	"	"	43.2MC	"	"	A5	"
6.	"	"	"	44.3MC	"	"	A6	"
7.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	69MC (10MC Swp)	67.25MC	"	"		Loosely couple a separate marker generator to point (E) (on top of tuner). Set the generator to 45.75MC. Adjust the fine tuning control to zero beat the two markers as observed on scope. Remove the separate marker generator.
8.	"	"	"	67.25MC 70.5MC	"	"		Check for response curve as in Fig.2. If necessary, retouch A4 and A6 alternately for best response. A6 affects tilt and A4 affects dip of curve. Next retouch A5 for proper slope at 42.5MC side of response curve. Adjust A2 for proper video carrier frequency level (45.75MC). If curve still does not fall within limits, SLIGHTLY retouch A2 for desired response.

SOUND IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

Remove the first video IF tube (V3) from its socket.
Connect two matched 100KΩ (±1%) resistors in series from point (B) to chassis. The junction of these two resistors is alignment point (D) as shown on the schematic.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
9.	2200Ω Carbon Resistor	High side to point (A). Low side to chassis.	4.5MC (Unmod)	Any non-interfering channel	DC probe to point (B). Common to chassis.	A7, A8	Adjust for maximum deflection. Attenuate generator output to maintain not more than 10 volts at VTVM.
10.	"	"	"	"	DC probe to point (C). Common to point (D).	A9	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting

SOUND IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Remove V3 from its socket.
Use frequency modulated signal with 60∿ modulation and 450KC sweep. Use 120∿ sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
9.	2200Ω Carbon Resistor	High side to point (A). Low side to chassis.	4.5MC (450KC Swp)	4.5MC	Any non-interfering channel	Vert. Amp. to point (B). Low side to chassis.	A7, A8	Disconnect stabilizer capacitor C5. Adjust for curve of maximum amplitude and symmetry as in Fig. 3.
10.	"	"	"	"	"	Vert. Amp. to point (C). Low side to chassis.	A9	Reconnect stabilizer capacitor C5. Adjust so that 4.5MC occurs at center of crossover lines as in Fig. 4. SLIGHTLY retouch A8 for maximum amplitude and straightness of crossover lines.

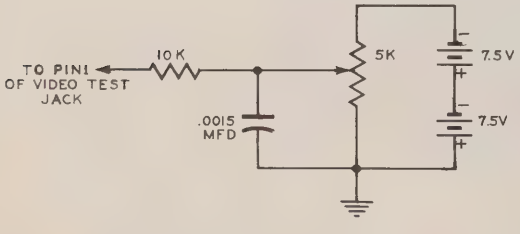

FIG.1

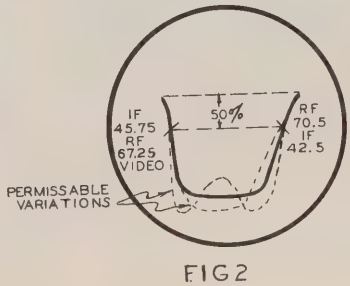

FIG2

FIG.3

ALIGNMENT INSTRUCTIONS (cont)

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OSCILLATOR ALIGNMENT

Disconnect the tuner AGC (White) lead from its main chassis terminal. Connect the negative lead of a 1.5 volt battery to the white lead from tuner. Connect the positive lead to chassis. If regeneration occurs, bias may be increased to 4 or 5 volts.
Couple the 45.75 MC output of a second signal generator to the first video IF amplifier tube (V3) by removing the tube shield and attaching the output leads of the generator to the ends of a few turns of wire wrapped around the tube. The output is set at 45.75 MC throughout the entire oscillator alignment.
Preset the fine tuning for all adjustments by placing the stop on the fine tuning cam between the channel 7 and 8 holes on the tuner front plate.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50Ω.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
11.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	Not used	211.25MC	13	Vert. Amp. thru 15KΩ to point (A). Low side to chassis.	A10	Adjust for zero beat with 45.75MC IF signal as indicated on scope.
12.	"	"	"	199.25MC	11	"	A11	"
13.	"	"	"	187.25MC	9	"	A12	"
14.	Repeat step 13 until channels 13, 11 and 9 are within 500KC of their correct frequencies.							
15.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	Not used	175.25MC 83.25MC 67.25MC	7 6 4	Vert. Amp. thru 15KΩ to point A. Low side to chassis.	A13 A14 A15	Adjust for zero beat with 45.75MC IF signal as indicated on scope.

RF AND MIXER ALIGNMENT

Leave the bias connected as under oscillator alignment.
Disconnect the plug (Phono Type) from tuner to link.
Connect a 40 to 70Ω resistor across tuner plug.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50Ω.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
16.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	213MC (10MC Swp)	210MC 213MC 216MC	13	Vert. Amp. thru 1000Ω to point (G). Low side to chassis.	A16, A17	Adjust A16 and A17 for a symmetrical approximately centered band pass. Detune A17 counter clockwise until a single peak appears. Adjust A16 until peak falls at 213MC. Readjust A16 and A17 for symmetrical response as in Fig. 5.
17.	"	"	177MC (10MC Swp)	174MC 177MC 180MC	7	"	A18, A19	Check for response as indicated by dotted line curves in Figs. 6A and 6B. If response is not symmetrical and centered about 177MC. Adjust A18 and A19 for mirror image of original response curve. This adjustment overcompensates to allow for the affect of channel 13 adjustment on channel 7. Switch receiver and generator back to channel 13 and SLIGHTLY retouch A16 and A17 for response similar to Fig. 5, then repeat step 17.
18.	"	"	85MC (10MC Swp)	82MC 85MC 88MC	6	"	A20, A21 A22	Adjust A20 and A21 for a symmetrical approximately centered band pass. Detune A20 counter clockwise until a single peak appears. Adjust A21 until the peak falls at 85MC. Adjust A22 for maximum curve height and symmetry. Readjust A20 and A21 for symmetrical response as in Fig. 5. Remove resistor across tuner plug and insert tuner plug in the tuner plug socket.

UHF TUNER-ADAPTER ALIGNMENT

The UHF tuner adapter has been properly aligned at the factory and is very stable. Alignment of this portion of the receiver should not be attempted in the field. If tube replacement becomes necessary the new tube may detune the tuner. If this happens, try several tubes until one is found that gives the most satisfactory performance.

4.5MC TRAP ALIGNMENT

Turn the set on and tune in a TV station.
Adjust A23 for minimum beat pattern as observed on the picture tube.

VIDEO PEAKING COIL ADJUSTMENT

In case of excessive overshoot or smear on some stations it may be necessary to adjust A24.
Alignment of the tuner and IF portion of the receiver must be correct before this adjustment is made. Clockwise adjustment reduces trailing whites and overshoot. Counter clockwise adjustment reduces amount of smear and increases trailing whites. Proper adjustment point is the point of minimum smear and trailing whites.

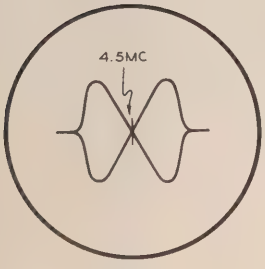


FIG. 4

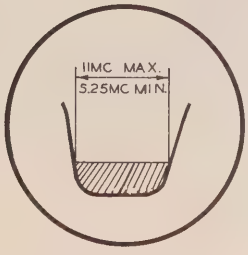


FIG. 5

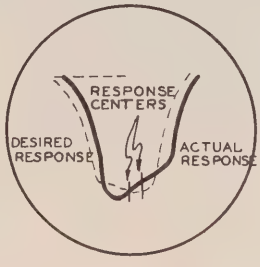


FIG. 6A

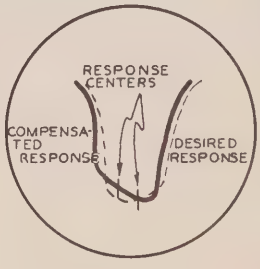
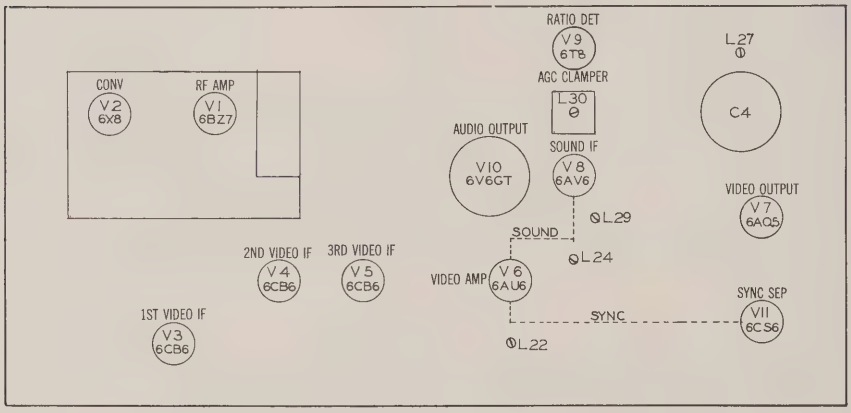


FIG. 6B

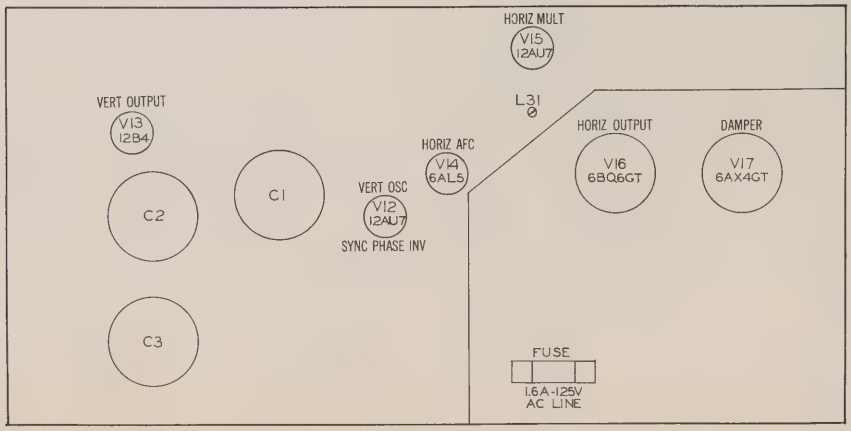
RESISTANCE MEASUREMENTS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6BZ7	† 1KΩ	750KΩ	INF	0Ω	.1Ω	INF	2.5Meg	0Ω	0Ω
V 2	6X8	0Ω	10KΩ	† 33KΩ	0Ω	.1Ω	0Ω	100KΩ	† 47KΩ	† 10KΩ
V 3	6CB6	700KΩ	47Ω	.1Ω	0Ω	† 3.5KΩ	† 3.5KΩ	0Ω		
V 4	6CB6	700KΩ	68Ω	.1Ω	0Ω	† 13KΩ	† 13KΩ	0Ω		
V 5	6CB6	9KΩ	270Ω	.1Ω	0Ω	† 3.5KΩ	† 3.5KΩ	0Ω		
V 6	6AU6	220KΩ	0Ω	0Ω	.1Ω	† 13.6KΩ	† 8KΩ	39Ω		
V 7	6AQ5	820KΩ	1.2KΩ	0Ω	.1Ω	† 3KΩ	† 0Ω	820KΩ		
V 8	6AU6	4Ω	0Ω	0Ω	.1Ω	† 15KΩ	† 15KΩ	330Ω		
V 9	6T8	INF	36KΩ	INF	0Ω	.1Ω	2.2Meg	0Ω	10Meg	◓ 320KΩ
V 10	6V6GT	† 220KΩ	.1Ω	† 500Ω	† 0Ω	470KΩ	† 0Ω	0Ω	390Ω	
V 11	6CS6	† 1.5Meg	0Ω	.1Ω	0Ω	33KΩ	† 13KΩ	2.2Meg		
V 12	12AU7	† 14KΩ	1Meg	2.2KΩ	.1Ω	.1Ω	† 1.5Meg	420KΩ	1KΩ	0Ω
V 13	12B4	0Ω	4.5Meg	.0Ω	.1Ω	.1Ω	INF	4.5Meg	INF	† 2.5KΩ
V 14	6AL5	4.8Meg	4.8Meg	0Ω	.1Ω	15KΩ	0Ω	15KΩ		
V 15	12AU7	† 52KΩ	90KΩ	1.2KΩ	.1Ω	.1Ω	† 20KΩ	9.4Meg	1.2KΩ	.0Ω
V 16	6BQ6GT	1.7Meg	0Ω	† 16KΩ	† 8.7KΩ	1.5Meg	600KΩ	.1Ω	0Ω	TOP CAP ◓ 26Ω
V 17	6AX4GT	13KΩ	INF	150KΩ	INF	2Ω	INF	.1Ω	0Ω	
V 18	1B3GT	PINS 1-8 HAVE INF. RESISTANCE								TOP CAP ◓ 746Ω
V 19	17YP4	0Ω	470KΩ	PIN 10 ◓ 47KΩ	PIN 11 † 250KΩ	PIN 12 .1Ω				

† MEASURED FROM OUTPUT OF M1.
◓ MEASURED FROM PIN 3 OF V17.

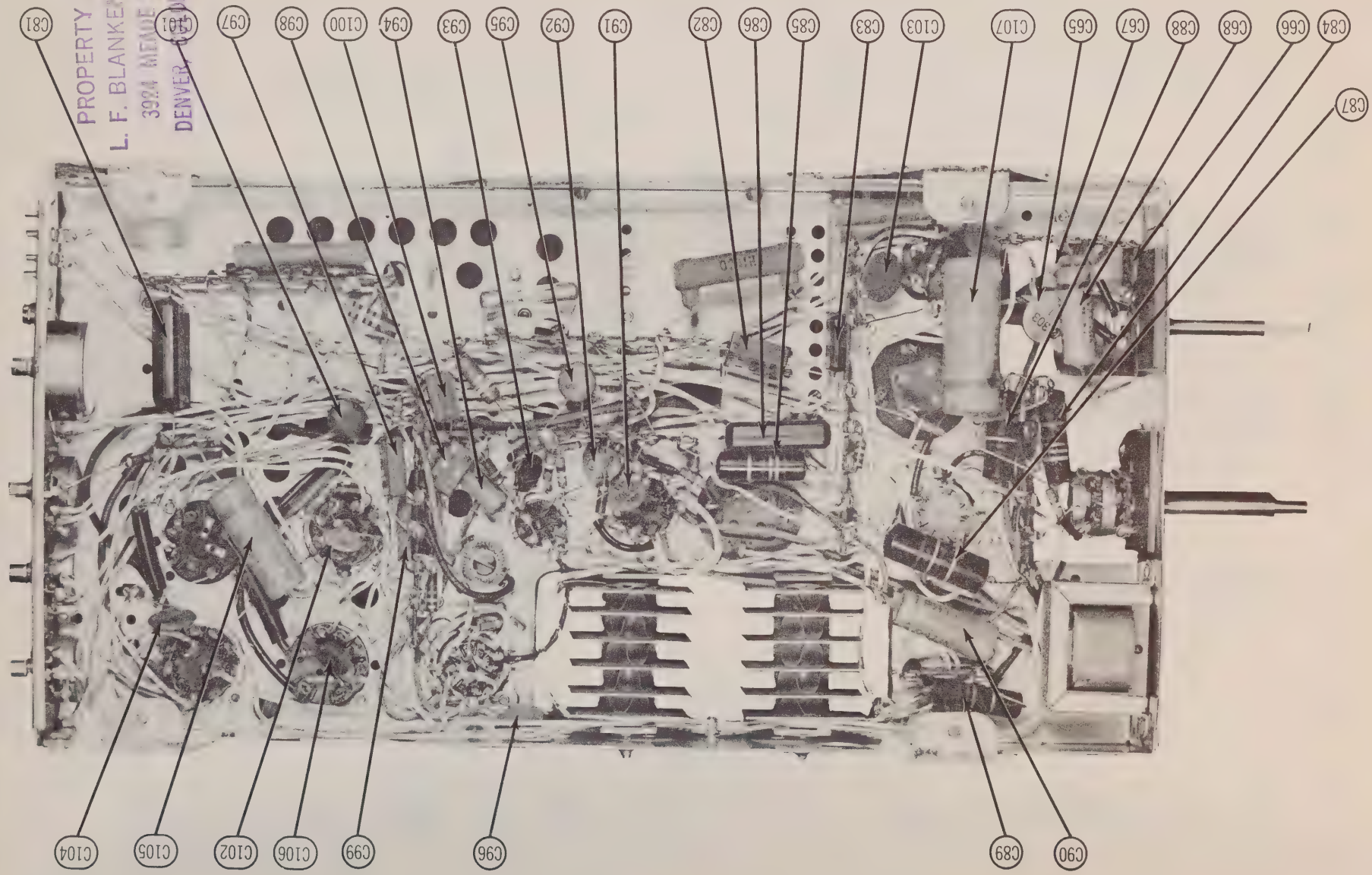


BOTTOM VIEW

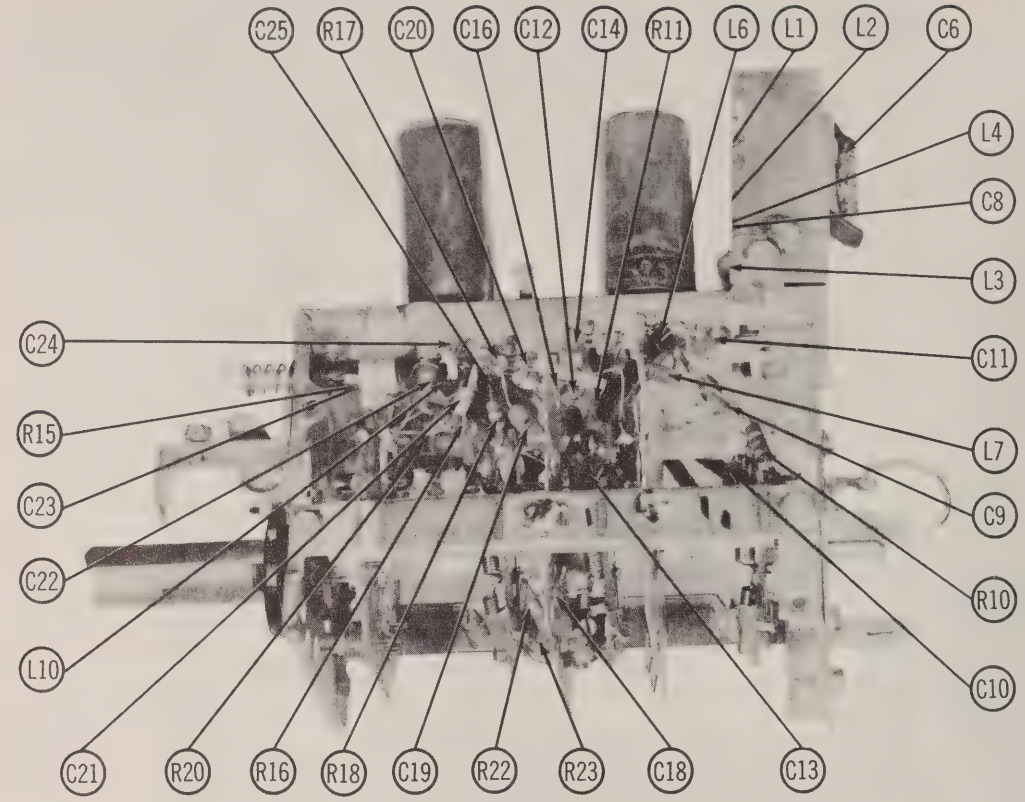


TUBE PLACEMENT CHART

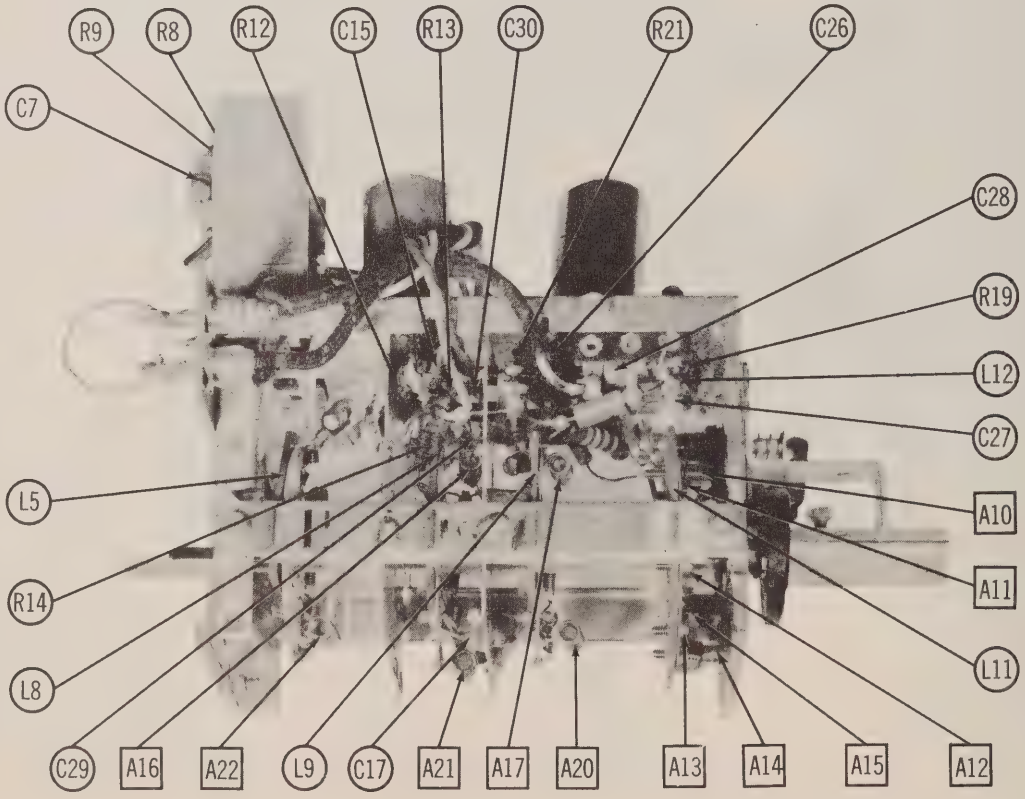
SWEEP CHASSIS-BOTTOM VIEW-CAPACITOR IDENTIFICATION



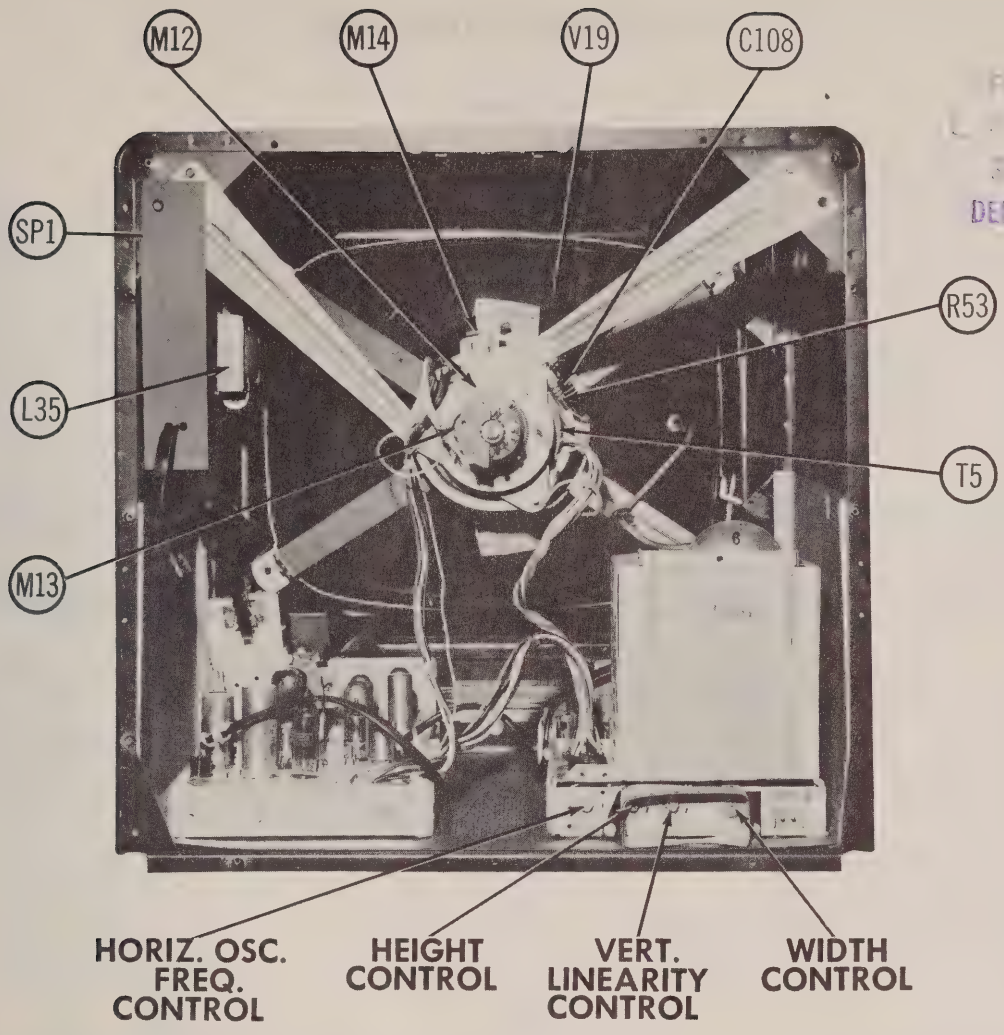
PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO



RF TUNER-RIGHT SIDE



RF TUNER-LEFT SIDE



CABINET—REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Turn the set on and tune in a TV station, preferably a test pattern.

Reduce the picture width until approximately one inch of blank screen appears on each side of picture. Increase the brightness control setting until the blanking time becomes visible as indicated by a dark bar at each side of the picture.

Connect a .1MFD capacitor from point ◇F to ground.

Set the horizontal hold control at the center of its range. Adjust the horizontal hold centering control until the picture is centered between the two blanking bars. Remove the .1MFD capacitor.

Adjust the horizontal ringing coil slug (B1) until the picture is again centered between the two blanking bars.

Rotate the horizontal hold control thru its range.

The picture should lose sync at both extremes of rotation. If it does not, readjust the horizontal hold centering until that condition is obtained.

Check the number of diagonal bars on either side of the pull-in range of the horizontal hold.

There should be 1 or 2 bars present.

If proper pull-in is not obtained, repeat the above procedure.

Adjust the width control for a picture slightly wider than necessary to fill the picture mask horizontally.

PROPERTY OF
[illegible]GENSHIP
[illegible] SIDE ST
DENVER, COLORADO

TROUBLE SHOOTING AIDS

CAUTION

Use an isolation transformer when servicing this receiver. One side of the AC line is connected to the chassis through C2 and L35 in series. The other side is connected to chassis through M3 , R121, C3A and M4 in series. Failure to use an isolation transformer will greatly increase the shock hazard and may result in damage to the receiver and/or test equipment. Use an isolation transformer of at least 225 watts capacity.

SWEEP

HORIZONTAL

LOSS OF SWEEP

Follow procedure outlined under "Loss of High Voltage".

INSUFFICIENT SWEEP

Check by substitution V15, V16 and V17. Check adjustment of the width control. Check waveform W15.

If Satisfactory	If Unsatisfactory
Check R7, R117, R118, C102, T3, T5A and other associated components.	Check C98, C99, C100, C101, R106, R110, R115 and other associated circuit components.

DRIVE LINES

Check by substitution V15, V16 and V17. Check C100, C101, C105, T3, T5A and other associated components.

COMPRESSED LEFT SIDE

Check by substitution V16 and V17. Check components associated with the horizontal output and damper stages especially T3 and T5A.

FOLDS

Follow procedure outlined under "Drive Lines".

XMAS TREE EFFECT

Substitute V15. Check C97, C98, C99, R110, R107, L31 and other associated circuit components.

VERTICAL

LOSS OF SWEEP

Check by substitution V12 and V13. Check waveform W9.

If Satisfactory	If Unsatisfactory
Check T4, T5B, R98 and other associated circuit components.	Check C85, C86, C87, R92, R94, R97 and other associated components.

INSUFFICIENT SWEEP

Check by substitution V12 and V13. Check adjustment of height and vertical linearity controls. Proceed as outlined under "Loss of Sweep".

COMPRESSED AT TOP

Check by substitution V12 and V13. Check associated circuit components.

COMPRESSED AT BOTTOM

Check by substitution V12 and V13. Check associated circuit components especially T4 and T5B.

SYNC

LOSS OF HORIZONTAL AND VERTICAL SYNC

Check by substitution V11 and V12. Check components associated with V11 and V12A.

LOSS OF VERTICAL SYNC- HORIZONTAL SYNC SATISFACTORY

Check by substitution V11 and V12. Check waveform W7.

If Satisfactory	If Satisfactory
Check components associated with V12B.	Check vertical integrator network and other associated components.

LOSS OF HORIZONTAL SYNC - VERTICAL SYNC SATISFACTORY

Check by substitution V14 and V15. Check associated components especially C97, C98, C99 and L31.

HORIZONTAL BENDING

Check by substitution V14, V15 and V16. Check horizontal AFC network (R103, R105, C95, C96) components for failure or change of value.

VIDEO

LOSS OF VIDEO

Substitute V7. Check C54, C55, picture tube and other associated components.

SOUND BARS (4.5MC BEAT)

Check adjustment of the fine tuning. Check adjustment A23. Check video IF alignment.

POOR CONTRAST

Check by substitution V6 and V7. Check video detector crystal and assembly. Check picture tube and other associated components.

NEGATIVE PIX

Check by substitution V6, V7 and V11. Check video detector assembly. Check AGC network for component failure or change of value.

SMEAR

Check video peaking coil adjustment (A24). Follow procedure outlined in the alignment section. Check by substitution V6 and V7. Check video detector assembly. Check C53, C54, C55, C49, R40, R42, R43, R46, R48, R49, R50, picture tube, L25 and other associated components.

WIDE BLACK BAR ACROSS PIX

Check V1, V2, V3, V4, V5, V6 and V7 for heater to cathode leakage.

PROPERTY OF
L. F. ROWNTREE
1000 MEADE ST.
DENVER, COLORADO

PHILCO MODELS 18B3002, 18BU3002, 18B3102, L, 18BU3102, L, 22B4002, L, 22BU4002, 22B4004, 22BU4004, 22B4102, L, 22BU4102, L, 22B4106, 22BU4106, 22B4109HM, 22BU4109HM, 22B4150, 22B4302, 22BU4302, 22B4304, 22BU4304, 22B4306, L, 22BU4306, L, 22B4307HM, 22BU4307HM (Ch. R-191, R-191U, D-191)

UHF TUNER SCHEMATIC

PHILCO UHF TUNER MODEL UT22

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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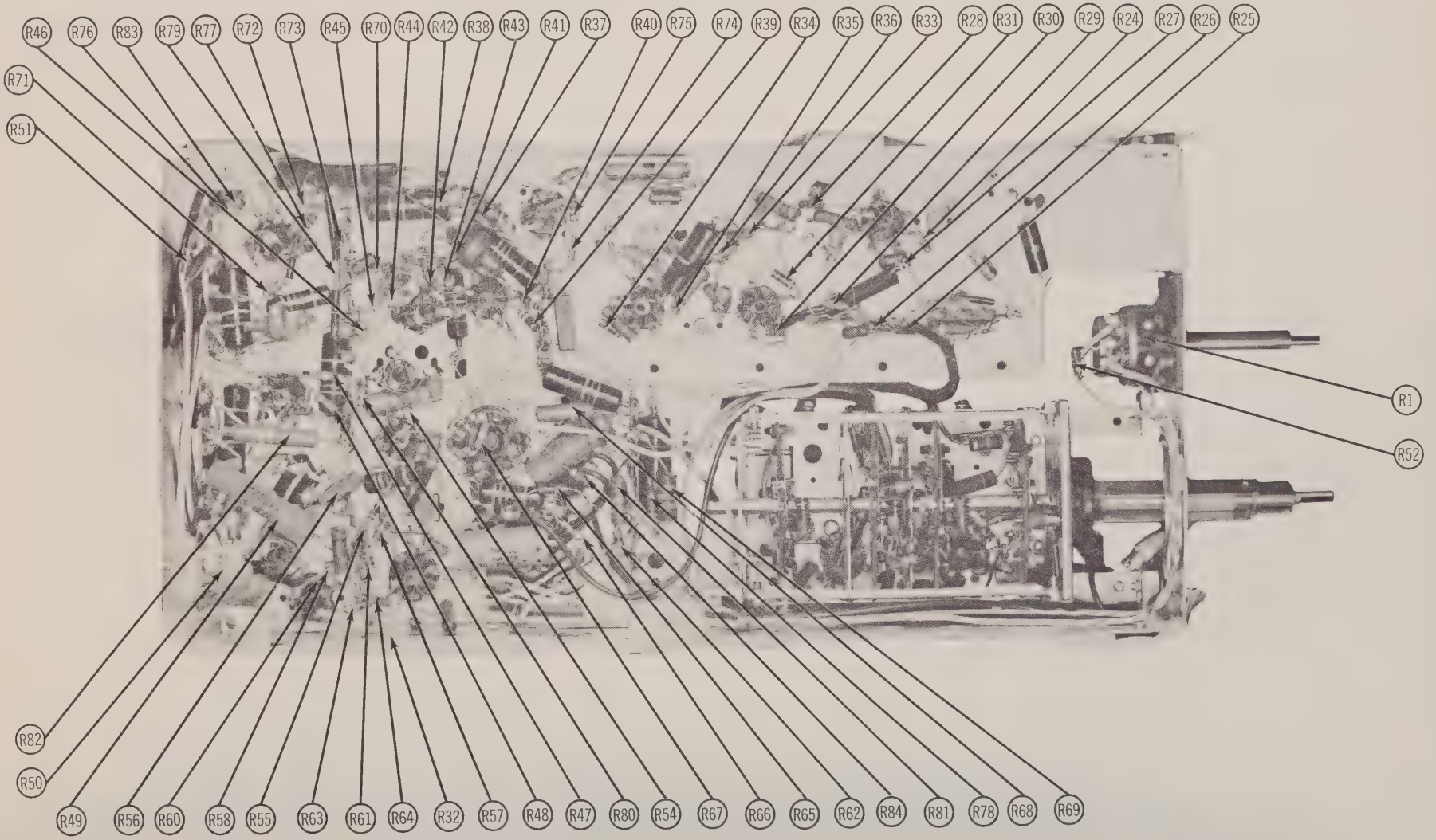


RF-IF CHASSIS-BOTTOM VIEW-RESISTOR IDENTIFICATION

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

PROPERTY OF
L. F[illegible]NKENSHIP
3[illegible] MEADE ST.
DENVER, COLORADO

ITEM No.	USE	REPLACEMENT DATA: PHILCO PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RETMA BASE TYPE	NOTES
V1	RF Amplifier	6BZ7	6BZ7	9AJ	
V2	Converter	6X8	6X8	9AK	
V3	1st. Video IF Amp.	6CB6	6CB6	7CM	
V4	2nd. Video IF Amp.	6CB6	6CB6	7CM	
V5	3rd. Video IF Amp.	6CB6	6CB6	7CM	
V6	Video Amplifier	6AU6	6AU6	7BK	
V7	Video Output	6AQ5	6AQ5	7BZ	
V8	Sound IF Amp.	6AU6	6AU6	7BK	
V9	Ratio Detector-AGC Clamper	6T8	6T8	9E	
V10	Audio Output	6V6GT	6V6GT	7S	
V11	Sync Separator	6CS6	6CS6	7CH	
V12	Sync Phase Inv. Vert. Oscillator	12AU7	12AU7	9A	
V13	Vert. Output	12B4	12B4	9AG	
V14	Horiz. AFC	6AL5	6AL5	6BT	
V15	Horiz. Mult.	12AU7	12AU7	9A	
V16	Horiz. Output	6BQ6GT	6BQ6GT	6AM	
V17	Damper	6AX4GT	6AX4GT	4CG	
V18	HV Rectifier	1B3GT	1B3GT	3C	

CATHODE-RAY TUBE

ITEM No.	REPLACEMENT DATA: PHILCO PART No.	SYLVANIA PART No.	GENERAL ELECTRIC PART No.	WESTINGHOUSE PART No.	RETMA BASE TYPE	NOTES
V19A	17YP4	17YP4		17YP4	12D	① Circuit changes necessary.
B	21ZP4	21ZP4	17VP4/17LP4 21ZP4		12D	
		21ZP4A ①			12D	
		21ZP4B ①			12D	
		21AFP4 ①			12D	
		21YP4 ①			12C	
		21YP4A ①			12C	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: PHILCO PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C1	120	150	30-2568-51	AFHS1-73		XA007		FP140	TVL-1540	
C2	120	150	30-2568-51	AFHS1-73		XA007		FP140	TVL-1540	
C3A	■80	300	30-2584-35	AFH4-95		D114		FP333.8	TVL-4801	
B	▲20	475		PRS450/80				TC83		
C	▲20	300								
D	10	300								
C4A	■40	300	30-2584-33	AFH3-28		CO22		FP330.7	TVL-3570	
B	▲10	300								
C5	2	50	30-2417-7	E26E6		BBR2-50T		TC302	TVA-1301	
C6	470		30-1225-18	SI470	D6-471		GP2K-471	UC-5347	5GA-T47	
C7	470		30-1225-18	SI470	D6-471		GP2K-471	UC-5347	5GA-T47	
C8	20		30-1251-4							
C9	39		62-03940301l	SI39	D6-390		GP1K-390	UC-5439	5GA-Q39	
C10	220		62-12200101l	SI220	D6-221		GP2K-221	UC-5322	5GA-T22	
C11	220		62-12200101l	SI220	D6-221		GP2K-221	UC-5322	5GA-T22	
C12	.5-3		31-6520-3		829-3			CT565A		
C13	150		62-11500101l	SI150	D6-151	TM5T15	GP2K-151	UC-5315	5GA-T15	
C14	680		62-16800101l	SI680	D6-681		GP2K-681	UC-5368	5GA-T68	
C15	10000		30-1238-6	BPD-01	DD-103	TM5S1	811-01	DC-511	5HK-S1	
C16	.68		30-1221-11				NP0K-R68			
C17	.82		30-1221-10							
C18	4		30-1221-14							
C19	15		62-01540901l	SI15	D6-150		GP1K-150	UC-5415	5GA-Q15	
C20	.5-3		31-6520-7		829-3			CT565A		
C21	2.2		30-1221-6							
C22	15		30-1224-113							
C23	3.3		30-1224-114							
C24	220		62-12200101l	SI220	D6-221		GP2K-221	UC-5322	5GA-T22	
C25	680		62-16800101l	SI680	D6-681		GP2K-681	UC-5368	5GA-T68	
C26	3.3		30-1224-58							
C27	1-5				829-6					
C28	680		62-168001021	SI680	D6-681		GP2K-681	UC-5368	5GA-T68	
C29	800		30-1238-7	BPD-0008	DD-102	TM5T8	801-001	DC-521	5HK-D1	
C30	800		30-1238-7	BPD-0008	DD-102	TM5T8	801-001	DC-521	5HK-D1	
C31	1-5		31-6520-9		829-6					
C32	5		30-1224-28	SI5NP0			NP0K-050	ZT-555		
C33	1-5		31-6520-9		829-6					
C34	1500			SI1500	D6-152	TM5D15	GP2L-152	UC-5215	5HK-D15	
C35	1000			SI1000	D6-102	TM5D1	GP2L-102	UC-521	5HK-D1	
C36	470		30-1225-18	SI470	D6-471		GP2K-471	UC-5347	5GA-T47	
C37	1-5		31-6520-9		829-6					
C38	470		30-1225-18	SI470	D6-471		GP2K-471	UC-5347	5GA-T47	
C39	680		62-168001001	SI680	D6-681		GP2K-681	UC-5368	5GA-T68	
C40	1-5		31-6520-9		829-6					
C41	1500			SI1500	D6-152	TM5D15	GP2L-152	UC-5215	5HK-D15	
C42	.1	200		P288-1	DF-104	PJ2P1		PT401	2TM-P1	
C43	560	500	62-156001011							
C44	1500			SI1500	D6-152	TM5D15	GP2L-152	UC-5215	5HK-D15	
C45	1-5		31-6520-9		829-6					
C46	1500			SI1500	D6-152	TM5D15	GP2L-152	UC-5215	5HK-D15	
C47	5		30-1224-28	SI5NP0	TCZ-4.7		NP0K-050	ZT-555	5TCCB-V47	
C48	18									Note 1
C49	.047	200		P488-047	DF-503	PTE4S47		PT4147	2TM-S47	
C50	330		62-133001001	SI330	D6-331		GP2K-331	UC-5333	5GA-T33	
C51	.015	200		P288-015		PTE6S15			6TM-S15	
C52	27									Note 2
C53	100		62-110409001	SI100	D6-101	TM5T1	GP1K-101	UC-531	5GA-T1	
C54	.047	400		P488-047	DF-503	PTE4S47		PT4147	4TM-S47	
C55	.047	400		P488-047	DF-503	PTE4S47		PT4147	4TM-S47	

PARTS LIST AND DESCRIPTIONS (Continued)

CAPACITORS (cont)

ITEM No.	RATING CAP.	RATING VOLT	REPLACEMENT DATA PHILCO PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C55	.1	200	P288-1	DF-104	DF-104	PT2P1		PT401	5TM-P1	
C57	2.2		30-1221-6	S12.2NP0	TC2-2.2		NP0K-2R2		5TCCB-V22	
C58	18		62-018400021							
C59	.0033	400	P688-0033	D6-332	PTE5D33	GP2-333-432	PT2G33	6TM-D33		
C60	.01	400	P488-01	D6-103	PTE4S1	GP2-333-103	PT411	4TM-S1		
C61	330		62-133001001	SI330	D6-331	GP2K-331	UC-5333	5GA-T33		
C62	150		62-115001001	SI150	D6-151	TM5T15	GP2K-151	UC-5315	5GA-T15	
C63	1500			SI1500	D6-152	TM5D15	GP2L-152	UC-5215	5HK-D15	
C64	.0022	400		P688-0022	D6-222	PTE5D22	GP2-333-222	PT2222	5TM-D22	
C65	10000			BPD-01	DD-103	TM5B1	811-01	DC-511	5HK-S1	
C66	5000			BPD-005	DD-502	TM5D5	811-005	DC-525	5HK-D5	
C67	10000			BPD-01	DD-103	TM5B1	811-01	DC-511	5HK-S1	
C68	.03	400		P489-03		PTE5S3		PT413	5TM-S3	Note 3
C69	1500			SI1500	D6-152	TM5D15	GP2L-152	UC-5215	5HK-D15	
C70	.0068	400		P688-0068	D6-682	PTE5D68	GP2-333-682	PT6268	5TM-D68	
C71	.0068	1000	30-4650-91	PI068-0068		PTE15D68		PT18268	MB-D68	
C72	.047	200		P488-047	DF-503	PTE4S47		PT4147	4TM-S47	
C73	33			SI33	D6-330		GP1K-330	UC-5433	5GA-Q33	
C74	220		62-122001001	SI220	D6-221		GP2K-221	UC-5322	5GA-T22	
C75	.0047	600		P688-0047	D6-472	PTE6D47	GP2-333-472	PT2647	6TM-D47	
C76	.1	200		P288-1	DF-104	PJ2P1		PT401	2TM-P1	
C77	.1	200		P288-1	DF-104	PJ2P1		PT401	2TM-P1	
C78	.0047	600		P688-0047	D6-472	PTE6D47	GP2-333-472	PT2647	6TM-D47	
C79	.047	200		P488-047	DF-503	PTE4S47		PT4147	4TM-S47	
C80	.15	200		P288-15		PTE4P15		PT4015	2TM-P15	
C81	.047	400	30-4668-45	P488-047	DF-503	PTE4S47		PT4147	4TM-S47	
C82	.0047	600	30-4668-56	P688-0047	D6-472	PTE6D47	GP2-333-472	PT2647	6TM-D47	
C83	.0022	400		P688-0022	D6-222	PTE5D22	GP2-333-202	PT2222	6TM-D22	
C84	.033	200		P488-033				PT4133		
C85	.015	400		P488-015		PTE5S15			5TM-S15	
C86	.047	400	30-4668-45	P488-047		PTE4S47		PT4147	4TM-S47	
C87	.1	400		P488-1	DF-104	PTE4P1		PT401	4TM-P1	
C88	.1	200		P288-1	DF-104	PJ2P1		PT401	2TM-P1	
C89	.022	400		P488-022	DF-303	PTE4S22		PT4123	4TM-S22	
C90	.047	400		P488-047	DF-503	PTE4S47		PT4147	4TM-S47	
C91	1000			BPD-001	DD-102	TM5D1	801-001	DC-521	5HK-D1	
C92	1000			BPD-001	DD-102	TM5D1	801-001	DC-521	5HK-D1	
C93	2000			BPD-002	DD-202	TM5D2	801-002	DC-522	5HK-D2	
C94	.01	400		P488-01	D6-103	PTE4S1	GP2-333-103	PT411	4TM-S1	
C95	2000			BPD-002	DD-202	TM5D2	801-002	DC-522	5HK-D2	Note 4
C96	10000			BPD-01	DD-103	TM5B1	811-01	DC-511	5HK-S1	
C97	2200	500								
C98	83	500	60-00825317							
C99	390	500	60-10395417	1469-0004		5R5T4		MCB243	MS-34	
C100	390	500	60-10395417	1469-0004		5R5T4		MCB243	MS-34	
C101	5000			BPD-005	DD-502	TM5D5	811-005	DC-525	5HK-D5	
C102	1000			BPD-001	DD-102	TM5D1	801-001	DC-521	5HK-D1	
C103	10000			BPD-01	DD-103	TM5B1	811-01	DC-511	5HK-S1	
C104	10000			BPD-01	DD-103	TM5B1	811-01	DC-511	5HK-S1	
C105	.047	600	30-4671-62	P688-047		PTE6S47		PT6147	6TM-S47	
C106	68	2000	30-1246-1	HVD30-000068					20GA-Q68	
C107	.47	200	30-4671-34	P288-47		PJ2P5		PT405	2TM-P47	
C108	.01	600		P688-01		PTE6S1		PT611	6TM-S1	

Note 1. Not used in all Models.
Note 2. Some Models use 68MMF in this application (part #62-068400901).
Note 3. Values from .01MFD to .05MFD may be used in this application. Replace with original value.
Note 4. Some Models may use 1000MMF in this application.

CONTROLS

ITEM No	RATING RESIST-ANCE	RATING WATTS	REPLACEMENT DATA PHILCO PART No	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No	MALLORY PART No.	INSTALLATION NOTES
R1A	2500Ω	2	33-5563-51	* QJ-357	RTV-359		WF252	Contrast - panel
B	100KΩ	½	Not Req.				UR15L	Brightness - rear
R2A	50KΩ	½	33-5563-50	* QJ-356	RTV-358	SBB-T18	UF54L	Horiz. Hold - panel
B	250KΩ	½	Not Req.				UR254L††	Vert. Hold - rear
R3A	2Meg	½	33-5564-14	QJ6-139X	AT-116	BT-82-S	UT-45L	Volume tapped at 1 Meg
B	Shaft		Not Req.	Not Req.	FS-3	Not Req.	Not Req.	Attach to R3A
C	Switch		Not Req.	76-1	SWA	Not Req.	U8-26	Attach to R3A
R4A	250KΩ	½	33-5565-17	QU-130	AB-50	AG-55-8	SU-46	Horiz. Osc. freq. control
B	Shaft		Not Req.	RQ	FKS-1/4	AK-1	Not Req.	Attach to R4A
R5A	2.5Meg	½	33-5565-32	QU-239	AG-84-8	AB-83	SU-565	Height
B	Shaft		Not Req.	RQ	FKS-1/4	AK-1	Not Req.	Attach to R5A
R6A	5 Meg	½	33-5565-31	QU-141	AG-85-8	AB-87	SU-67	Vert. Linearity
B	Shaft		Not Req.	RQ	FKS-1/4	AK-1	Not Req.	Attach to R6A
R7A	12,500Ω	½	33-5546-51	WK-12,500	A43-15,000	**WK-137	R15000L	Width
B	Shaft		Not Req.	Not Req.	FKS-1/4	Not Req.	Not Req.	Attach to R7A

* CONCENTRIKIT EQUIVALENT KIT-K-3 BASE ELEMENTS & SHAFTS W71-111 & P3-131 (panel)
B11-128 & R1-216 (rear).
• CONCENTRIKIT EQUIVALENT KIT-K-2 BASE ELEMENTS & SHAFTS B11-123 & P1-200 (panel)
B11-130 & R1-216 (rear).
† Universal replacement (Mallory exact duplicate Part. No. UE966).
** Add 2500Ω fixed wire wound resistor in series with control.

RESISTORS

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA PHILCO PART No.	IRC PART No.	NOTES
R8	1Meg	½		BTS-1Meg	
R9	1Meg	½		BTS-1Meg	
R10	22KΩ	½		BTS-22K	
R11	1000Ω	½		BTS-1000	
R12	1.5Meg	½ 5%		BTS-1.5Meg 5%	
R13	1.5Meg	½ 5%		BTS-1.5Meg 5%	
R14	1000Ω	½		BTS-1000	
R15	10KΩ	½		BTS-10K	
R16	33KΩ	1	66-3334340	BTA-33K	
R17	100KΩ	½		BTS-100K	
R18	47KΩ	½		BTS-47K	
R19	56KΩ	½		BTS-56K	
R20	10KΩ	½		BTS-10K	
R21	10Ω	½		BTS-10	
R22	1500Ω	½		BTS-1500	
R23	3300Ω	½		BTS-3300	
R24	56KΩ	½		BTS-56K	
R25	1000Ω	½		BTS-1000	
R26	1000Ω	½		BTS-1000	
R27	47Ω	½		BTS-47	
R28	220Ω	½		BTS-220	
R29	52KΩ	½		BTS-52K	
R30	68Ω	½		BTS-68	
R31	1000Ω	½		BTS-1000	
R32	3300Ω	6.2	33-3446-11		
R33	12KΩ	½		BTS-12K	
R34	270Ω	½		BTS-270	
R35	27KΩ	½		BTS-27K	
R36	220Ω	½		BTS-220	
R37	10KΩ	½		BTS-10K	Note 1
R38	3900Ω	½		BTS-3900	
R39	4.7Meg	½		BTS-4.7Meg	
R40	220KΩ	½		BTS-220K	Note 2
R41	3.9Ω	½		BTS-39	
R42	47KΩ	½		BTS-47K	
R43	4700Ω	½		BTS-4700	
R44	4700Ω	½		BTS-4700	Note 1
R45	5600Ω	½		BTS-5600	
R46	4700Ω	½		BTS-4700	
R47	820KΩ	½		BTS-820K	
R48	1.5Meg	½		BTS-1.5Meg	
R49	3300Ω	10	33-1335-121	1 3/4A-3300	
R50	470KΩ	½		BTS-470K	
R51	180KΩ	½		BTS-180K	
R52	22KΩ	½		BTS-22K	
R53	470KΩ	1	66-4474340	BTA-470K	
R54	330Ω	½	66-1394340	BTS-330	
R55	33KΩ	½		BTS-33K	
R56	12KΩ	1	66-3124340	BTA-12K	
R57	270Ω	½		BTS-270	
R58	22KΩ	½		BTS-22K	
R59	68KΩ	½		BTS-68K	
R60	33KΩ	½		BTS-33K	
R61	2700Ω	½		BTS-2700	
R62	10Meg 5%	½		BTS-10Meg 5%	
R63	10KΩ	½		BTS-10K	
R64	10Meg	½		BTS-10Meg	
R65	10Ω	½		BTS-10	
R66	270KΩ	½		BTS-270K	
R67	470KΩ	½		BTS-470K	
R68	3900	1	66-1394340	BTA-390	
R69	18KΩ	2	66-3185340	BTB-18K	
R70	150KΩ	½		BTS-150K	
R71	27KΩ	½		BTS-27K	
R72	560KΩ	½		BTS-560K	
R73	1Meg 5%	½		BTS-1Meg 5%	
R74	820KΩ	½		BTS-820K	
R75	680KΩ	½		BTS-680K	
R76	220KΩ	½		BTS-220K	
R77	27KΩ	½		BTS-27K	
R78	8200Ω	½		BTS-8200	
R79	470KΩ	½		BTS-470K	
R80	680KΩ	½		BTS-680K	
R81	6800Ω	1	66-2684340	BTA-6800	
R82	12KΩ	2	66-3125340	BTB-12K	
R83	33KΩ	½		BTS-33K	
R84	1000Ω	½		BTS-1000	
R85	1Meg	½		BTS-1Meg	
R86	2200Ω	½		BTS-2200	
R87	10KΩ	½		BTS-10K	
R88	3900Ω	½		BTS-3900	
R89	22KΩ	½		BTS-22K	
R90	4700Ω	½		BTS-4700	
R91	220KΩ	½		BTS-220K	
R92	1000Ω	½		BTS-1000	
R93	56KΩ	½		BTS-56K	
R94	3300KΩ	½		BTS-3300K	
R95	6800Ω	½		BTS-6800	
R96	1Meg	½		BTS-1Meg	
R97	2.2Meg	½		BTS-2.2Meg	
R98	2200Ω	5	33-1335-97	1 3/4A-2250	
R99	1000Ω	½		BTS-1000	
R100	1000Ω	½		BTS-1000	
R101	100KΩ	½		BTS-100K	
R102	100KΩ	½		BTS-100K	
R103	4.7Meg	½		BTS-4.7Meg	
R104	15KΩ	½		BTS-15K	
R105	4.7Meg	½		BTS-4.7Meg	
R106	1200Ω	½		BTS-1200	
R107	15KΩ	½		BTS-15K	
R108	4700Ω	½		BTS-4700	
R109	56KΩ	½		BTS-56K	
R110	47KΩ	½		BTS-47K	
R111	10KΩ	½		BTS-10K	
R112	39KΩ	1	66-3394340	BTA-39K	
R113	39KΩ	1	66-3394340	BTA-39K	
R114	470KΩ	½		BTS-470K	
R115	1Meg	½		BTS-1Meg	
R116	12KΩ	½		BTS-12K	
R117	5000Ω	5	33-1335-101	1 3/4A-5000	
R118	82KΩ	1	66-3824340	BTA-82K	
R119	47KΩ	1	66-3474340	BTA-47K	
R120	4.7Ω	1	66-9474340		
R121	5Ω	10	33-3448-5	1 3/4A-5	
R122	1Meg	½		BTS-1Meg	
R123	27KΩ	½		BTS-27K	

Note 1. Some Models may use a 6800Ω resistor in this application.
Note 2. Some Models may use a 220KΩ resistor in this application.

TRANSFORMER (POWER)

ITEM No.	RATING PRI.	RATING SEC. 1	RATING SEC. 2	RATING SEC. 3	REPLACEMENT DATA PHILCO PART No.	STANCOR PART No.	MERIT PART No.	Halldorson PART No.	TRIAD PART No.	RCA TYPE No.
T1	117VAC	6.7VAC @ .6A	6.3VAC @ 8.5A		32-8573-2 ② 32-8590 ②	P-6308 ①	P-2948 ①	F5516 ①	F-21A①	

① Drill new mounting holes.
② Alternate filament trans.

TRANSFORMER (SWEEP CIRCUITS)

ITEM No.	RATING DC RESISTANCE PRI.	RATING SEC.	REPLACEMENT DATA PHILCO PART No.	STANCOR PART No.	MERIT PART No.	Halldorson PART No.	TRIAD PART No.	RCA TYPE No.	NOTES
T2	170Ω	320Ω	32-8431-8	A-8126 ②					Vert. Osc. Trans.
T3	787.3Ω tap ④ 140, 80.3Ω, 43.3Ω, 67.3Ω		32-8431-2 ① 32-8624	A-8220 ②			D-24 & WC-11③ ④		Horiz. Output Trans. ⑤
T4	320Ω tap ⑥ 8Ω		32-8625-1 32-8625 ⑤						Vert. Output Trans.
T5A	45Ω		32-9648	DY-12⑤⑦	MDF-71 ⑥⑦	DF604⑤ ⑦	Y-24⑥⑦		Horiz. Deflection Coils
B	51Ω								Vert. Deflection Coils

① Alternate vertical osc. trans.
② Connect as in original circuit except, connect original terminal #7 to new terminal #8, connect terminal #7 to chassis ground.
③ Connect terminal #8 to terminal #7, then connect original 6BQ6 plate lead to terminal #9, original #2 to new #5, original #6 to new "T", original #1 to new #3. Connect primary of WC-11 across terminals #1 and #3, secondary to AFC. If picture is out of phase, reverse secondary.
④ Drill new mounting holes.
⑤ Alternate vertical output trans.
⑥ Use original deflection coil network.
⑦ Use original yoke plug and leads connected as in original yoke.
⑧ Drill one new mounting hole.
⑨ Includes L32.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	RATING IMPEDANCE PRI.	RATING IMPEDANCE SEC.	RATING DC RES. PRI.	RATING DC RES. SEC.	REPLACEMENT DATA PHILCO PART No.	STANCOR PART No.	MERIT PART No.	Halldorson PART No.	TRIAD PART No.	NOTES
T6	5.2KΩ	3.2Ω	494Ω	.68Ω	36-8629	A-3877 ①	A-3019	Z1002	S-5Z	① Drill one new mounting hole.

SPEAKER

ITEM No.	RATINGS SIZE	RATINGS FIELD	RATINGS V. C. IMP.	REPLACEMENT DATA PHILCO PART No.	VIKING PART No	QUAM PART No.	NOTES
SP1A	6"	PM	3.3Ω	36-1641-17	624	6A21	① Used in Models 22B4102, 22B4102L, 22BU4102, 22BU4102L, 22B4106, 22BU4106, 22B4109HM, 22B4150, 22B4305, 22BU4302 & 22BU4109HM
B	10"	PM	3.3Ω	36-1646-6 ① 36-1651 ② 36-1641-10 ③ 34-1646-8 ④	10J11	10A31	② Used in Models 18B3002, 18BU3002, 18BJ3102, 18BU3102, 18BJ3102L & 18BU3102L ③ Used in Models 22B4002, 22B4002L, 22B4004, 22BU4002 & 22BU4004 ④ Used in Models 22B4304, 22BU4304, 22B4306, 22BU4306, 22B4306L, 22BU4306L, 22B4307HM, 22BU4307HM, 22B4306, 22BU4306 & 22BU4306L

COILS (RF-IF)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA PHILCO PART No	MEISSNER PART No	MERIT PART No.	MILLER PART No	NOTES
L1	Ant. Trans.	.7Ω	.7Ω	32-4332-3				
L2	Ant. Trans.	.7Ω	.7Ω					Part of L1
L3	IF Trap	0Ω		32-4552-1				Wound on 22MMF cap.
L4	FM Trap	0Ω		32-4550-3				
L5	Ant. Coils	0Ω		36-8410				Includes wafer switch
L6	Fil. Choke	0Ω		32-4550-1				
L7	Neutr. Coil	0Ω		312-5145-22				
L8	RF Coils	0Ω		76-8409				Includes wafer switch
L9	Mixer grid Coils	0Ω		76-8408				Includes wafer switch
L10	Fil. Choke	0Ω		32-4550-11				
L11	Osc. Coils	0Ω		76-8407				Includes wafer switch
L12	RF Choke	.3Ω		312-5151-10				
L13	Video IF Coupling trans.	0Ω	0Ω	32-4599-1				
L14	IF Trap Coil	.1Ω		32-4597-2			4604	1.2Microhenries
L15	IF Coupling	.3Ω		32-4548-12	19-3001	TV-189	6175	84 Microhenries
L16	Fil Choke	.1Ω		32-4112-15	19-3001	TV-189	4606	2.9 Microhenries
L17	1st Video IF	.1Ω	.1Ω	32-4598-4			6219 *	
L18	2nd Video IF	.1Ω	.1Ω	32-4598			6219 *	
L19	3rd Video IF	.1Ω	.1Ω	32-4598-2			6219 *	
L20	Series Peak. Coil	8.2Ω		32-4428-27			4612	10 Microhenries; Part # CL-1
L21	Series Peak. Coil	.4Ω					4606	3 Microhenries
L22	Variable Series Peak. Coil	4Ω					4563	29-78 Microhenries; Note 1
L23	Shunt. Peak. Coil	5.5Ω		32-4480-4	19-3250	TV-185	6181	250 Microhenries
L24	4.5MC Trap	4.2Ω		32-4483-2	20-1004	TV-151	1470	
L25	Series Peak. Coil	7Ω		32-4480-4	19-3250	TV-185	6181	250 Microhenries
L26	Shunt Peak. Coil	5.5Ω		32-4480-4	19-3250	TV-185	6181	250 Microhenries
L27	Variable Shunt. Peak. Coil	8Ω		32-4467-16	19-1920		4563	60-240 Microhenries
L28	Series Peak. Coil	2.1Ω			19-3036	TV-180	5176	40 Microhenries
L29	Sound IF	4.2Ω		32-4483-9	17-3400	TV-151	1469	
L30	Ratio Det.	5.2Ω	.8Ω CT	32-4450-8A	17-3497	TV-115	6205	Tertiary winding - .7Ω
L31	Horiz. Osc.	170Ω		32-4557	19-1576	TV-183	6210	
L32	RF Choke	2.1Ω					4624	15.2 Microhenries Part of Horiz. Output Trans. T3.
L33	RF Choke	1.8Ω		32-4112-24			4612	11.4 Microhenries
L34	RF Choke	1.8Ω		32-4112-24			4612	11.4 Microhenries

Note 1. Some models may use a fixed 125 Microhenries series peak. coil in this application (Philcto Part #32-4480-8).
* Drill new mounting hole.

FILTER CHOKE

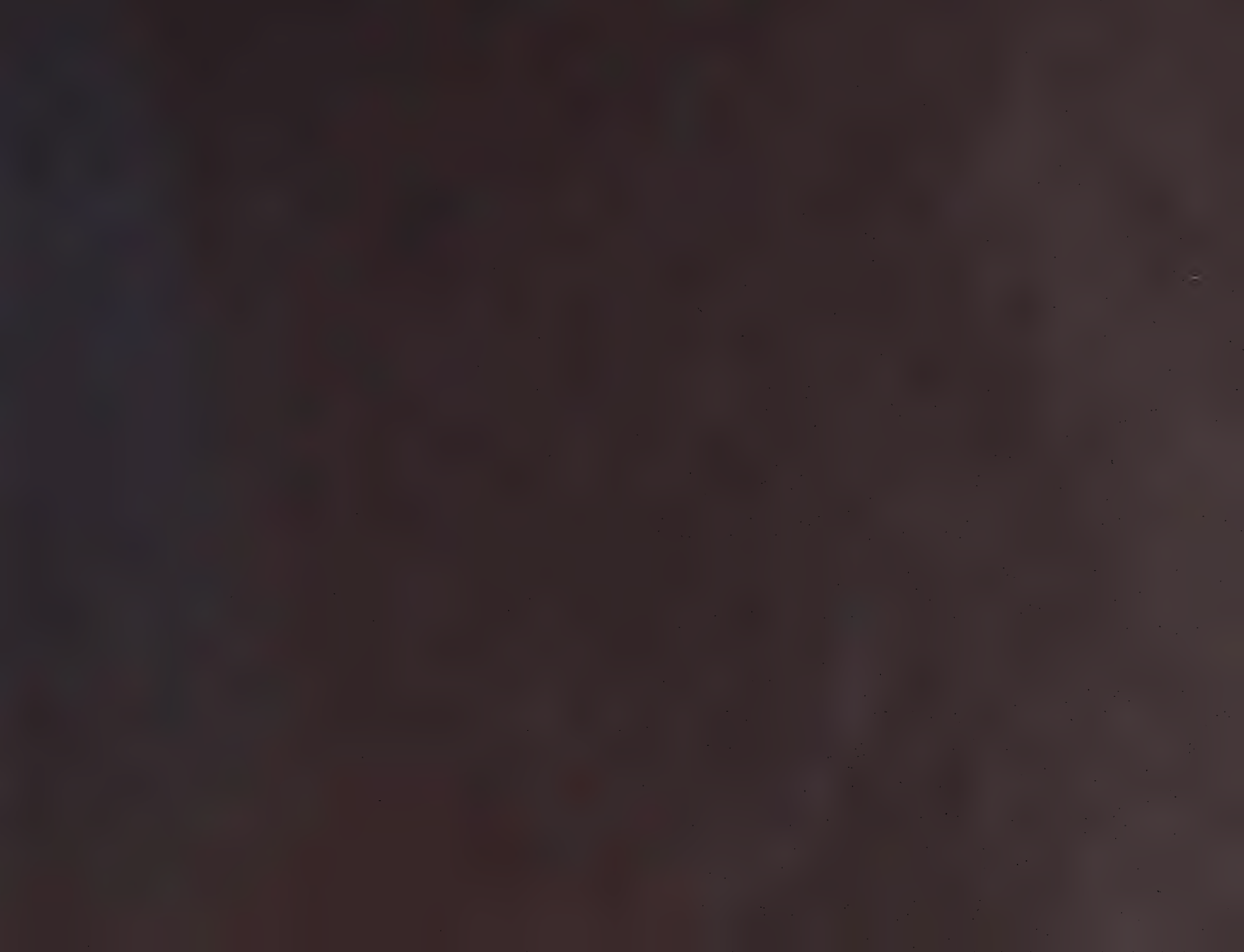
ITEM No.	RATINGS TOTAL DIRECT CURRENT	RATINGS D.C. RESISTANCE	RATINGS INDUCTANCE (0 CURRENT 1000 ~)	REPLACEMENT DATA PHILCO PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	TRIAD PART No.
L35	.270A	41Ω	1.14HY	32-8617	C-2326 ①	C-2996 ①	C5037 ①	C-17X ①

① Drill one new mounting hole.

SELENIUM RECTIFIER

ITEM No.	RATING CURRENT	REPLACEMENT DATA PHILCO PART No.	SELETRON PART No.	FEDERAL PART No.	MALLORY PART No.	SARKES TARZIAN PART No	NOTES
M1	.270A	34-8003-7	6Q4	1090A	65300	300	① Alternate selenium rectifier.
M2	.270A	34-8003-7 34-8003-16 ①	6Q4	1090A	65300	300	

PHILCO MODELS 18B3002, 18BU3002, 18BJ3102, 18BU3102, L, 22B4002, L, 22BU4002, 22B4004, 22BU4004, 22B4102, L; 22BU4102, L; 22B4106, 22BU4106, 22B4109HM, 22BU4109HM, 22B4150, 22B4302, 22BU4302, 22B4304, 22BU4304, 22B4306, L, 22BU4306, L, 22B4307HM, 22BU4307HM (Ch. R-191, R-191D, D-191)



PARTS LIST AND DESCRIPTIONS (Continued)

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			PHILCO PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M3	3AG S/B P/T	1 6/10A	45-2656-23		31501. 6 (3AG S/B P/T 1 6/10A)		MDV 1 6/10	
M4			Piece of # 26 wire Pin 6 to 7 interchassis socket					

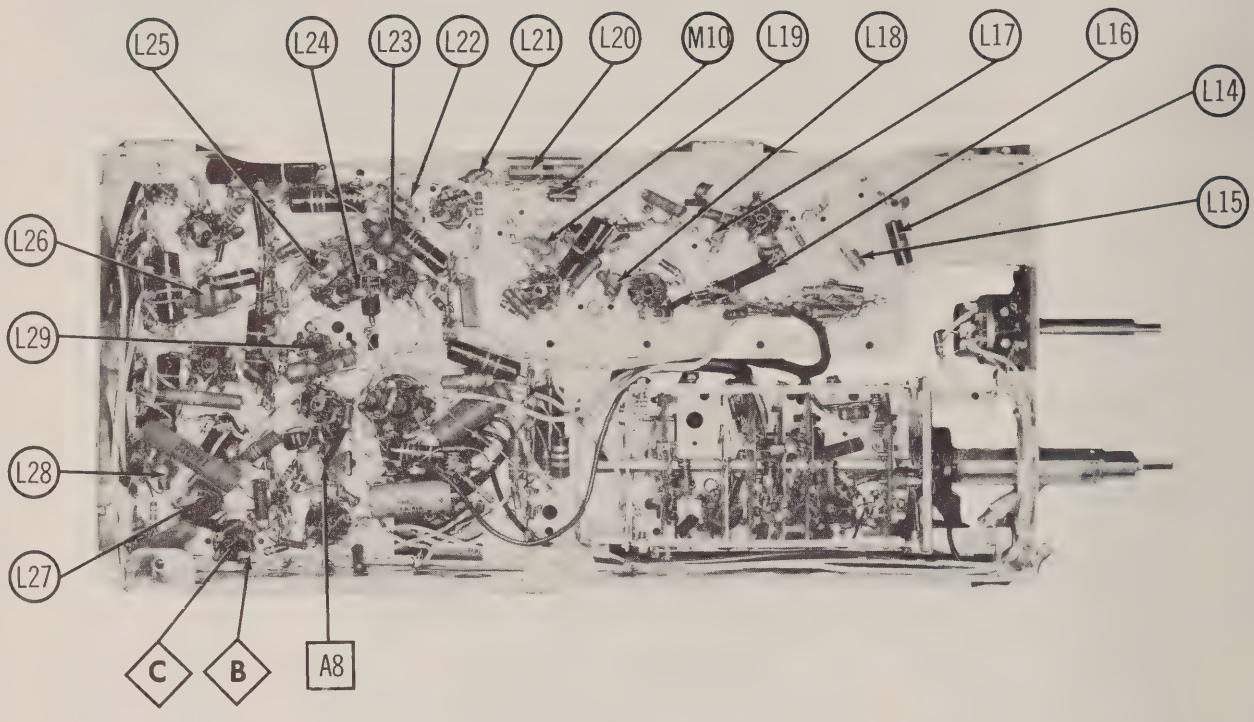
MISCELLANEOUS

ITEM No.	PART NAME	PHILCO PART No.	NOTES
M5	Dial light	34-2068	# 47 bayonet- VHF channel light
M6	Dial light	34-2068	# 47 bayonet- UHF channel light (2 used)
M7	Tuner	76-8400	VHF
M8	Tuner	43-6703	UHF adapter UT22 (not used in all models)
M9	Crystal	34-8026	CP2 UHF mixer-part of UT22 adapter
M10	Crystal	34-8022	1N64 video detector
M11	Switch		UHF-VHF selector-used on UHF models only
M12	Focus magnet	76-6126-4	PM-includes centering device
M13	Ion trap	76-6077-2	
M14	Correction magnet	76-6594	2 used
	Cabinet	10982-5	Metal-models 18B3002, 18BU3002
	Cabinet	10992	Mahog. - models 18B3102, 18BU3102
	Cabinet	10992-4	Light-models 18B3102L, 18BU3102L
	Cabinet	10996	Mahog. -models 22D4002, 22BU4002
	Cabinet	10996-2	Light-model 22B4002L
	Cabinet	10998	Mahog. -models 22B4004, 22BU4004
	Cabinet	11008	Mahog. -models 22B4102, 22BU4102
	Cabinet	11008-1	Light-models 22B4102L, 22BU4102L
	Cabinet	10995-1	Mahog. -models 22B4106, 22BU4106
	Cabinet	11017	Honey-maple- models 22B4109HM, 22BU4109HM
	Cabinet	11012-1	Mahog. -model 22B4150
	Cabinet	10978-2	Mahog. -models 22B4302, 22BU4302
	Cabinet	11019-1	Mahog. -models 22B4304, 22BU4304
	Cabinet	11025	Mahog. -models 22B4306, 22BU4306
	Cabinet	11016-1	Light-models 22B4306L, 22BU4306L
	Cabinet	11019	Honey-maple-models 22B4307HM, 22BU4307HM
	Knob	76-8457-1	Brightness
	Knob	76-8455-1	Channel selector
	Knob	54-4797-7	Contrast
	Knob	76-8456	Fine tuning
	Knob	54-4797-7	Horiz. hold
	Knob	76-8457-1	Vert. hold
	Knob	76-8484	Off-on volume
			Models 18B3002, 18BU3002, 18B3102, 18BU3102, 22B4002, 22BU4002, 22B4102, 22BU4102, 22B4150
	Knob	76-8457-2	Brightness
	Knob	76-8455-3	Channel selector
	Knob	54-4797	Contrast
	Knob	76-8456	Fine tuning
	Knob	54-4797	Hroiz. hold
	Knob	76-8457-2	Vert. hold
	Knob	76-8484-1	Off-on volume
			Models 18B3102L, 18BU3102L, 22B4002L, 22B4102L, 22BU4102L
	Knob	76-8457	Brightness
	Knob	76-8455	Channel selector
	Knob	76-6048-5	Contrast
	Knob	76-8456	Fine tuning
	Knob	76-6048-5	Horiz. hold
	Knob	76-8457	Vert. hold
	Knob	76-8484-2	Off-on volume
			Models 22B4004, 22BU4004, 22B4106, 22BU4106, 22B4109HM, 22BU4109HM, 22B4302, 22BU4302, 22B4304, 22BU4304, 22B4306, 22BU4306, 22B4307HM, 22BU4307HM
	Knob	76-8457-3	Brightness
	Knob	76-8455-4	Channel selector
	Knob	76-6048-6	Contrast
	Knob	76-8456	Fine tuning
	Knob	76-6048-6	Horiz. Hold
	Knob	76-8457-3	Vert. Hold
	Knob	76-8484-3	Off-on volume
			Models 22B4306L, 22BU4306L
	Safety glass	54-8293-3	18B3002, 18BU3002
	Safety glass	54-7943-68	18B3102, 18BU3102, 18B3102L, 18BU3102L
	Safety glass	54-8293-4	22B4002, 22BU4002, 22B4002L
	Safety glass	54-7943-71	22B4004, 22BU4004, 22B4102, 22BU4102, 22B4102L, 22BU4102L
	Safety glass	54-7943-69	22B4106, 22BU4106, 22B4109HM, 22BU4109HM
	Safety glass	54-7943-74	22B4150
	Safety glass	54-7943-49	22B4302, 22BU4302, 22B4307HM, 22BU4307HM
	Safety glass	54-7943-56	22B4304, 22BU4304, 22B4306, 22BU4306, 22B4306L, 22BU4306L

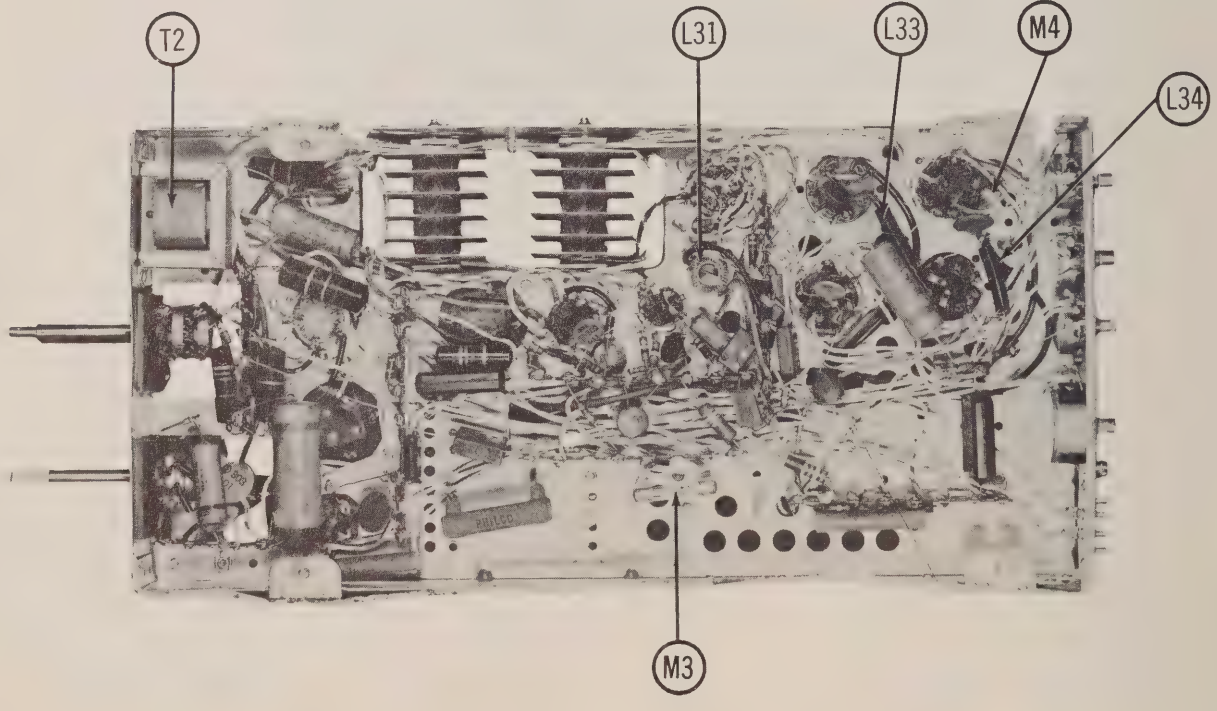
PROPERTY OF
L. F. BLANKENSHIP
[illegible] MAPLE ST.
DENVER, COLORADO

SWEEP CHASSIS-BOTTOM VIEW RESISTOR IDENTIFICATION

PHILCO MODELS 18B3002, 18BU3002, 18B3102, L, 18BU3102, L, 22B4002, L, 22BU4002, 22B4004, 22BU4004, 22B4102, L, 22BU4102, L, 22B4106, 22BU4106, 22B4109HM, 22BU4109HM, 22B4150, 22B4302, 22BU4302, 22B4304, 22BU4304, 22B4306, L, 22BU4306, L, 22B4307HM, 22BU4307HM (Ch. R-191, R-191U, D-191)



RF-IF CHASSIS-BOTTOM VIEW- INDUCTOR AND ALIGNMENT IDENTIFICATION



RF-IF CHASSIS-BOTTOM VIEW-TRANS., INDUCTOR IDENTIFICATION

TROUBLE SHOOTING AIDS (cont)

PROPERTY OF
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3984 MEADE ST.
DENVER, COLORADO

AUDIO

WEAK OR NO SOUND

Check by substitution V8, V9 and V10. Check stages of V9B and V10 using an audio signal generator. Apply audio signal across R64.

If Satisfactory	If Unsatisfactory
Check ratio detector and audio IF alignment and components.	Check components associated with V9B and V10.

BUZZ

Adjust A9 for minimum buzz. If buzz is still objectionable substitute V9 and realign the audio IF and ratio detector stages. Check C5 and C61.

DISTORTED

Follow procedure outlined under "Weak or No Sound".

POWER

DEAD SET

Check fuse M4, AC interlock assembly, switch on volume control and T1, if the filaments fail to light. If filaments light, check fuse M3, rectifiers M1 and M2. Check B+ filter and decoupling components.

SMALL AND/OR DIM PIX

Check rectifiers M1 and M2. Check B+ filter and decoupling network components.

HIGH VOLTAGE

LOSS OF HIGH VOLTAGE

Check by substitution V15, V16, V17 and V18. Check waveform W15.

If Satisfactory	If Unsatisfactory
Check R120, T3, T5A and other associated components.	Check C98, C99, C100, C101, R110, R115, R106, R107 and other associated components.

INSUFFICIENT HIGH VOLTAGE

Check by substitution V15, V16, V17 and V18. Check picture tube. Measure B+.

If Satisfactory	If Unsatisfactory
Proceed or outlined under "Loss of High Voltage".	Proceed as outlined under "Small and/or Dim Pix".

BLOOMING

Check by substitution V15, V16, V17 and V18. Check R120, T3, T5A, picture tube and other associated components.

GENERAL

RASTER SOUND NO PIX

Follow procedure outlined under "Loss of Video ".

RASTER NO SOUND NO PIX

Check by substitution V1, V2, V3, V4, V5 and V6. Check video detector assembly. Check components associated with the video IF strip.

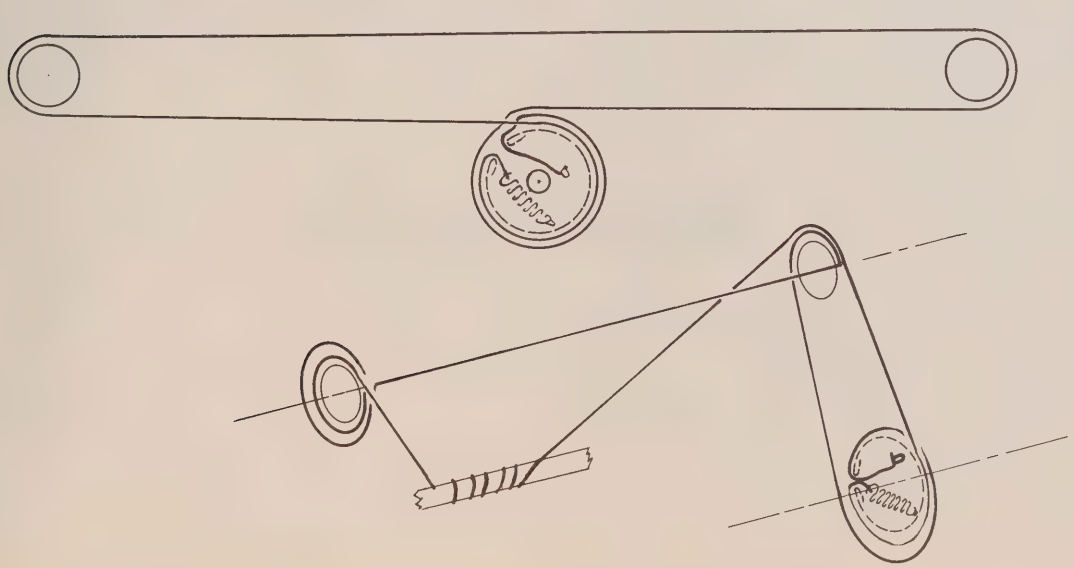
NO RASTER NO SOUND

Follow procedure outlined under "Dead Set".

INTERMITTENT STREAKS

Check video signal for interference pulses. Check high voltage section for corona discharge and arcing.

Symptoms shown are assumed and are not indicative of the quality and workmanship of this equipment.



UHF DRIVE CORD STRINGING

PHILCO MODELS 18B3002, 18BU3002, 18B3102, L, 18BU3102, L, 22B4002, L, 22BU4002, 22B4004, 22BU4004, 22B4102, L, 22BU4102, L, 22B4106, 22BU4106, 22B4109HM, 22BU4109HM, 22B4150, 22B4302, 22BU4302, 22B4304, 22BU4304, 22B4306, L, 22BU4306, L, 22B4307HM, 22BU4307HM (Ch. R-191, R-191U, D-191)

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

Touch-up adjustments of the RF tuner oscillator circuit may be accomplished by removal of the channel selector and fine tuning knobs.

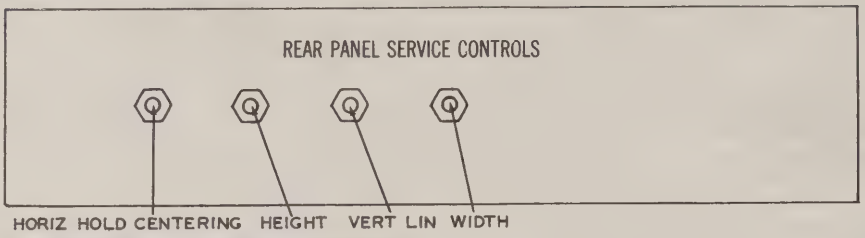
PICTURE TUBE SAFETY GLASS CLEANING

To clean safety glass remove four metal screws holding four corner brackets. Remove brackets and safety glass. Use extreme caution when removing safety glass.

PICTURE TUBE REMOVAL

For picture tube removal it is necessary to remove chassis. (See disassembly instructions).

SERVICE ADJUSTMENT LOCATION



HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

For adjustment of the horizontal oscillator, set the horizontal hold control to the center of its range and adjust the horizontal oscillator frequency control located on rear apron of sweep chassis until picture synchronizes horizontally. If results cannot be obtained see horizontal sweep circuit adjustment on page 11.

SOUND IF DETECTOR BUZZ ADJUSTMENT

To eliminate sound IF detector buzz, adjust the ratio detector secondary (L30) located on top of chassis. (See tube placement chart).

FUSES

One fuse is used for LV power supply protection. (For location, see tube placement chart).

CENTERING

Centering is accomplished mechanically by means of a centering lever on the PM focusing assembly. Adjust the centering lever from side to side, and up and down until the picture is properly centered.

ANTI-PIN CUSHION ADJUSTMENTS

Reduce the picture size so that the sides of the raster are visible, and position the magnets so that all sides are straight lines and the corners are at right angles.

DISASSEMBLY INSTRUCTIONS

1. Remove 8 push on type control knobs from front panel.
2. Remove 12 metal screws. Remove rear cover.
3. Disconnect speaker, yoke, CRT, HV plug, inner chassis connection cable, and volume control cable.
4. Remove 4 screws from each chassis and remove both chassis.
5. Remove 4 speaker nuts. Remove speaker.

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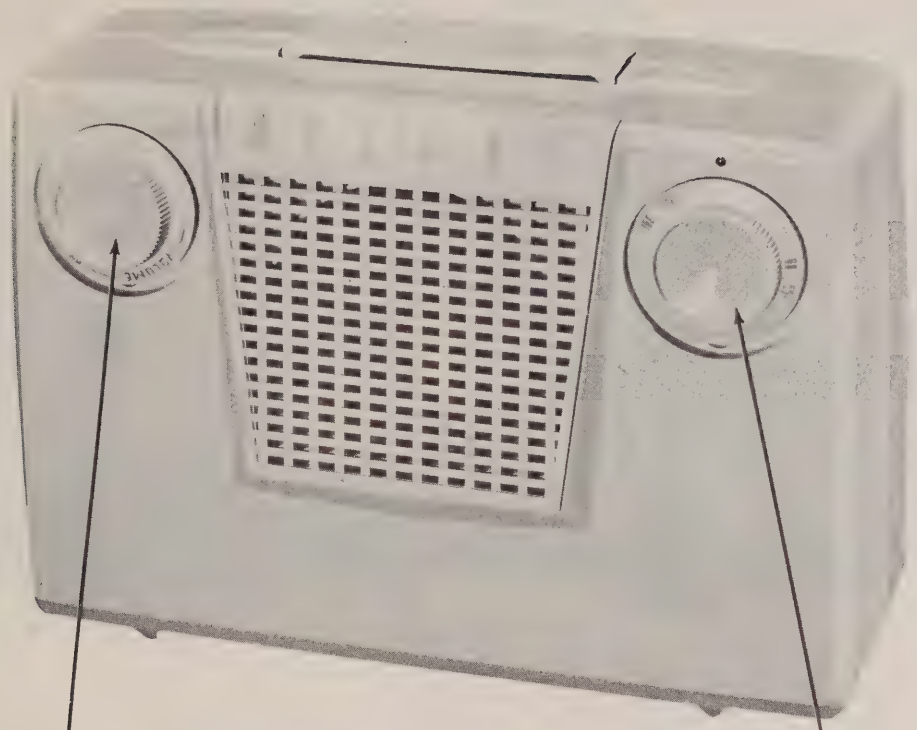
DENVER, COLORADO

ROLAND
MODEL 5P2



PROPERTY OF
L. F.
DENVER, COLORAD

VOLUME CONTROL
ON-OFF SWITCH

TUNING CONTROL

ROLAND
MODEL 5P2

TRADE NAME	Roland Model 5P2
MANUFACTURER	Roland Radio Corp., 12-30 Anderson Ave., Mt.Vernon, N.Y.
TYPE SET	Three Power Portable AM Superheterodyne Receiver
TUBES (Four)	Types 1R5 Conv., 1U4 IF Amp., 1U5 Det.-AVC-AF Amp., 3V4 Audio Output
POWER SUPPLY	105-120 Volts AC/DC (or) 7½ Volts "A" Supply & 90 Volts "B" Supply in Pack Form
RATING	.15 Amp. @ 117 Volts AC (or) 50MA @ 7½ Volts DC & 16MA @ 90 Volts DC
TUNING RANGE—BROADCAST	535-1620KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Use isolation transformer, if available. If not, connect a .1MFD capacitor in series with low side of signal generator and B-. Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.
To set pointer turn tuning gang fully closed and set last reference mark at low frequency end of dial opposite index mark on cabinet.
Loop should be maintained in same relative position to chassis as when receiver is in cabinet.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.01MFD	High side to pin 6 (grid) of 1R5 (V1). Low side to B-.	455KC (400~Mod)	Tuning gang fully open	Across voice coil	A1, A2, A3, A4	Adjust for maximum output. If isolation transformer is not used, reduce dummy antenna to .001MFD to reduce hum modulation.
2.		Loop	1620KC	"	"	A5	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output. Set should be installed in cabinet with batteries in place.
3.		"	1400KC	Tune to 1400KC signal	"	A6	"

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PARTS LIST AND DESCRIPTIONS

ROLAND MODEL 5P2

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		ROLAND PART No.	STANDARD REPLACEMENT		
V1	Converter	1R5	1R5	7AT	
V2	IF Amp.	1U4	1U4	6AR	
V3	Det-AVC-AF Amp.	1U5	1U5	6BW	
V4	Audio Output	3V4	3V4	6BX	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP.	VOLT	ROLAND PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C1A	40	150		PRS106D50A		BBRT4415-XV5		3N529		Red
B	40	150								Green
C	200	25								Yellow
C2	.05	200		P288-05	DF-503	PJ2S5		PT415	2TM-S5	
C3	47			SI47	D6-470		GP1K-470	UC-5447	5GA-Q47	
C4	.05	200		P288-05	DF-503	PJ2S5		PT415	2TM-S5	
C5	10000			BPD-01	DD-103	TM5S1	811-01	DC-521	5HK-S1	
C6	100			SI100	D6-101	TM5T1	GP1K-101	UC-531	5GA-T1	
C7	.002	400		P488-002	D6-202	PT4D2	GP2-333-202	PT422	4TM-D2	
C8	10000			BPD-01	DD-103	TM5S1	811-01	DC-521	5HK-S1	
C9	100			SI100	D6-101	TM5T1	GP1K-101	UC-531	5GA-T1	
C10	.002	400		P488-002	D6-202	PT4D2	GP2-333-202	PT422	4TM-D2	
C11	2000			BPD-002	DD-202	TM5D2	812-002	DC-522	5HK-D2	
C12	.05	200		P288-05	DF-503	PJ2S5		PT415	2TM-S5	
C13	.2	400		P488-2		PTE4P2		PT402	4TM-P2	
C14	.05	400		P488-05		PTE4S5		PT415	4TM-S5	
C15	.2	400		P488-2		PTE4P2		PT402	4TM-P2	

CONTROLS

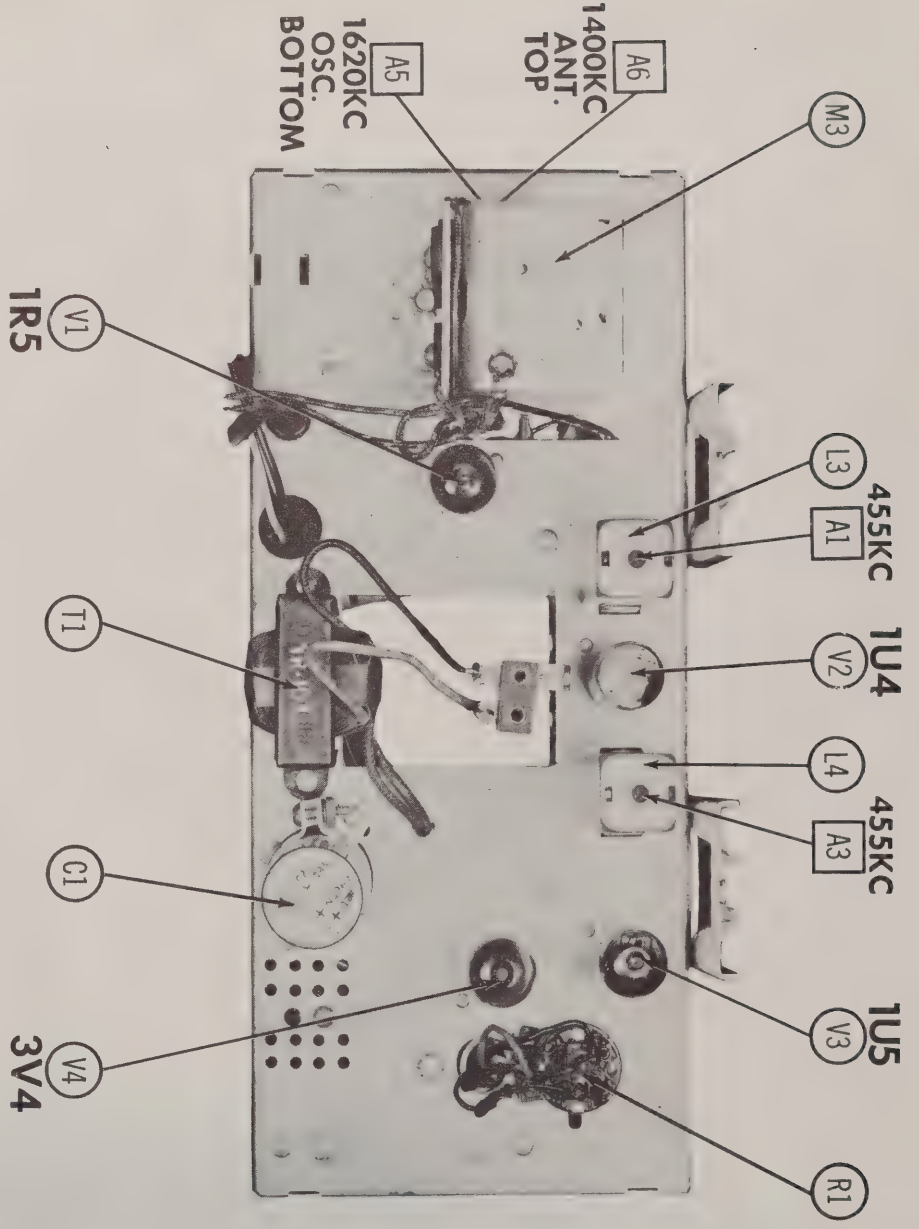
ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	ROLAND PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	
R1A	1Meg	½	VC-53	Q13-137	AG-63-Z	BSK-70-S	U-48	Volume
B	Shaft		Not Req.	Not Req. q	KSS-3	Not Req.	Not Req.	Attach to R1A
C	Switch		Not Req.	76-2	SWB-2	Not Req.	US-27	Attach to R1A

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	ROLAND PART No.	IRC PART No.	
R2	100KΩ	½		BTS-100K	
R3	3. 3Meg	½		BTS-3. 3Meg	
R4	8200Ω	½		BTS-8200	
R5	2. 2Meg	½		BTS-2. 2Meg	
R6	10Meg	½		BTS-10Meg	
R7	4. 7Meg	½		BTS-4. 7Meg	
R8	220KΩ	½		BTS-220K	

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	ROLAND PART No.	IRC PART No.	
R9	1Meg	½		BTS-1Meg	
R10	1000Ω	½		BTS-1000	
R11	1000Ω	½		BTS-1000	
R12	1500Ω	½		BTS-1500	
R13	2700Ω	1		BTA-2700	
R14	47Ω	1			
R15	1500Ω	10			

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA					NOTES
	IMPEDANCE		DC RES.		ROLAND PART No.	STANCOR PART No.	MERIT PART No.	Halldorson PART No.	TRIAD PART No.	
	PRI.	SEC.	PRI.	SEC.						
T1	9.7KΩ	3.4Ω	488Ω	.73Ω		A-3879	A-2932	Z1116	S-11X ①	① Drill one new mounting hole.

SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA			NOTES
	SIZE	FIELD	V. C. IMP.	ROLAND PART No.	JENSEN PART No.	QUAM PART No.	
SP1	4"	PM	3.4Ω		ST-113 Mod P4-X	4A1	

COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	ROLAND PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	Loop Ant.	1.4Ω						
L2	Osc. Coil	.5Ω	3.1Ω		14-1074		70-Osc.	
L3	Input IF	19Ω	19Ω	LF-24	16-6758	BC-352	12-C1	
L4	Output IF	19Ω	19Ω	LF-24	16-6758	BC-353	12-C2	

SELENIUM RECTIFIER

ITEM No.	RATING	REPLACEMENT DATA					NOTES
	CURRENT	ROLAND PART No.	SELETRON PART No.	FEDERAL PART No.	MALLORY PART No.	SARKES TARZIAN PART No.	
M1	.065A		8J1	1002A	6S65	65	

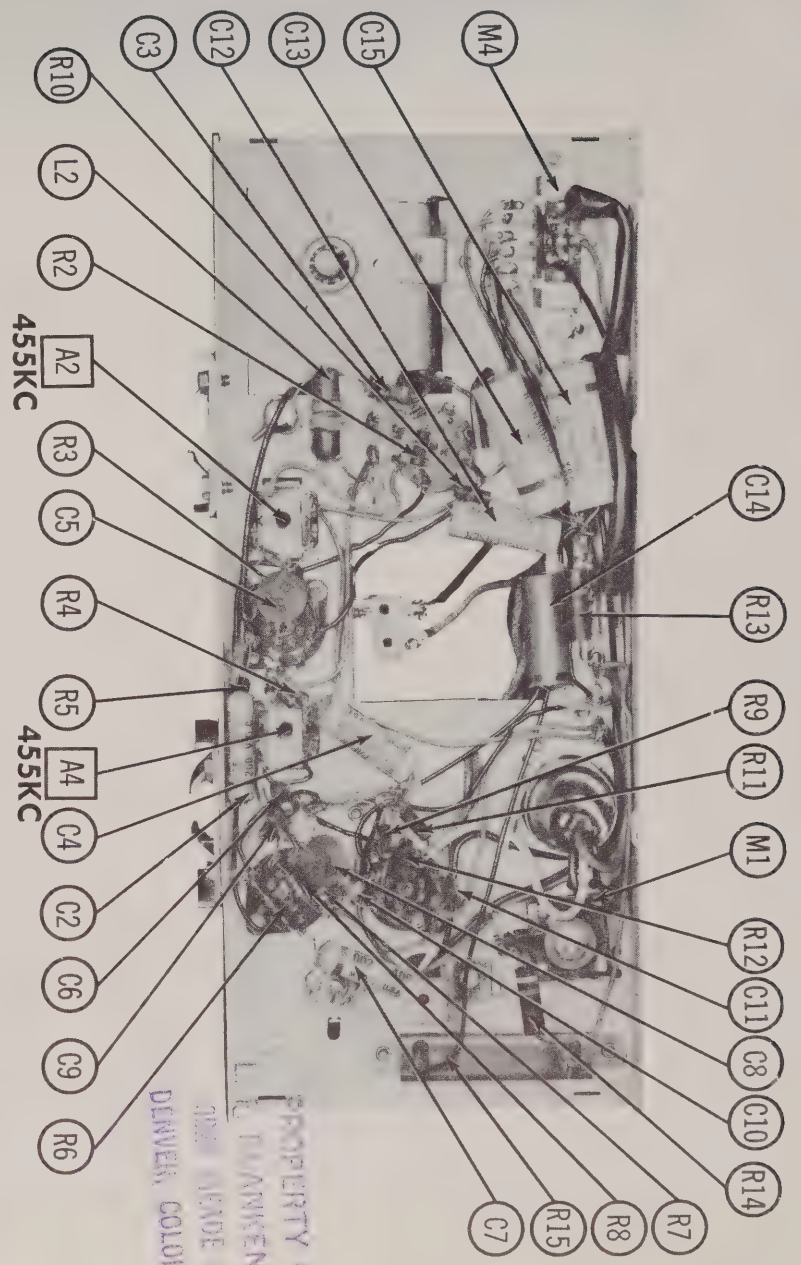
BATTERIES

ITEM No.	VOLTAGE	ROLAND PART No.	REPLACEMENT DATA						INSTALLATION NOTES
			EVEREADY			BURGESS			
			"A"	"B"	"A-B"	"A"	"B"	"A-B"	
M2	7½V "A" 90V "B"				756			T6Z60	

MISCELLANEOUS

ITEM No.	PART NAME	ROLAND PART No.	NOTES
M3	Tuning Cap.		2 gang (32-462MMF), (36-200MMF) CV27
M4	Switch		Power Selector

CHASSIS—BOTTOM VIEW

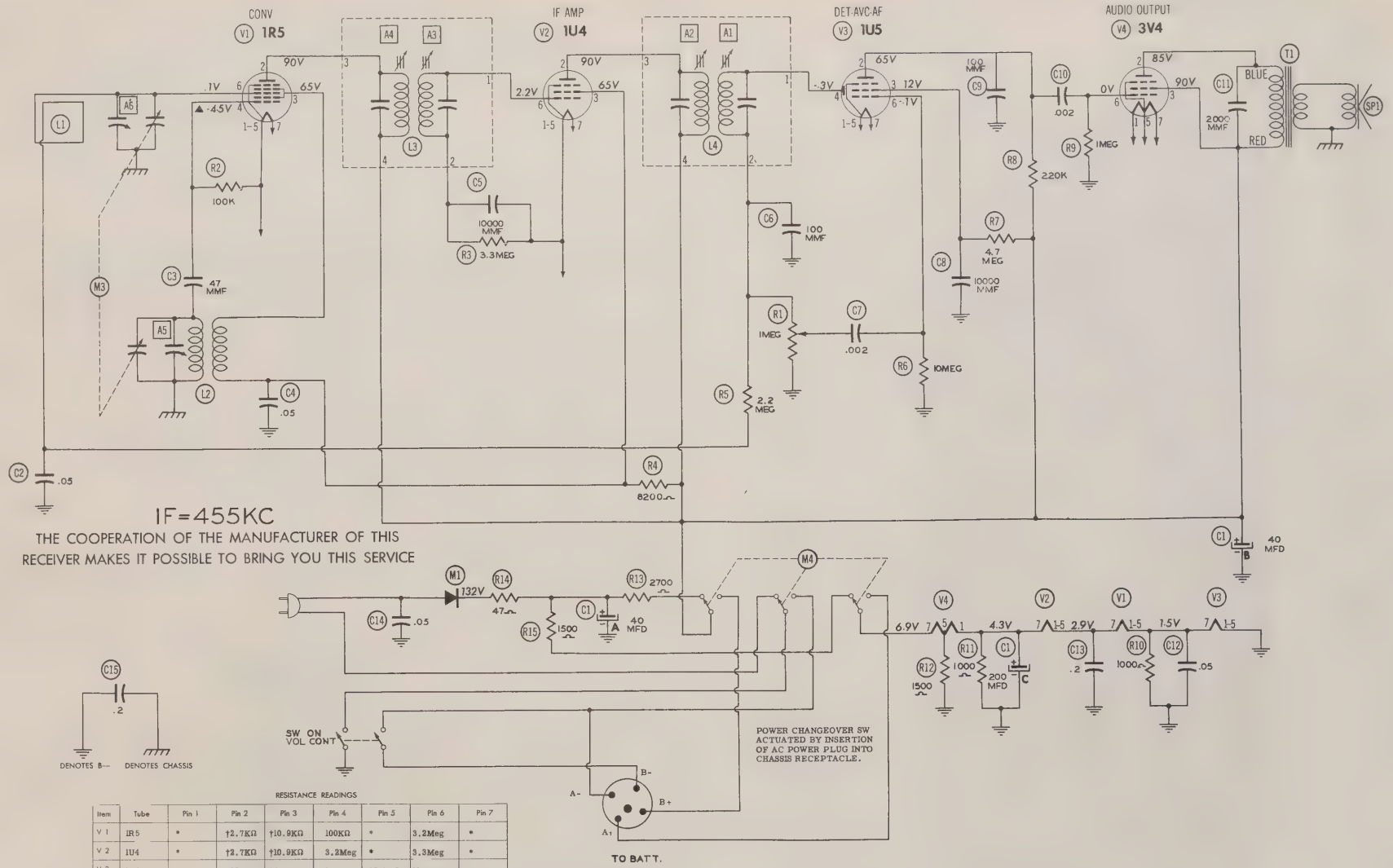


PROPERTY OF
L. L. TANNENSHIR
DENVER, COLORADO

SET 231
FOLDER 13

ROLAND MODEL 5P2

ROLAND MODEL 5P2



IF=455KC

THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V 1	1R5	*	†2.7KΩ	†10.9KΩ	100KΩ	*	3.2Meg	*
V 2	1U4	*	†2.7KΩ	†10.9KΩ	3.2Meg	*	3.3Meg	*
V 3	1U5	*	†220KΩ	†4.7Meg	1Meg	†2.7KΩ	10Meg	*
V 4	3V4	*	†3.2KΩ	†2.7KΩ	INF	*	1Meg	*

† MEASURED FROM OUTPUT OF M1
* DO NOT USE OHMMETER TO MEASURE FILAMENT RESISTANCE

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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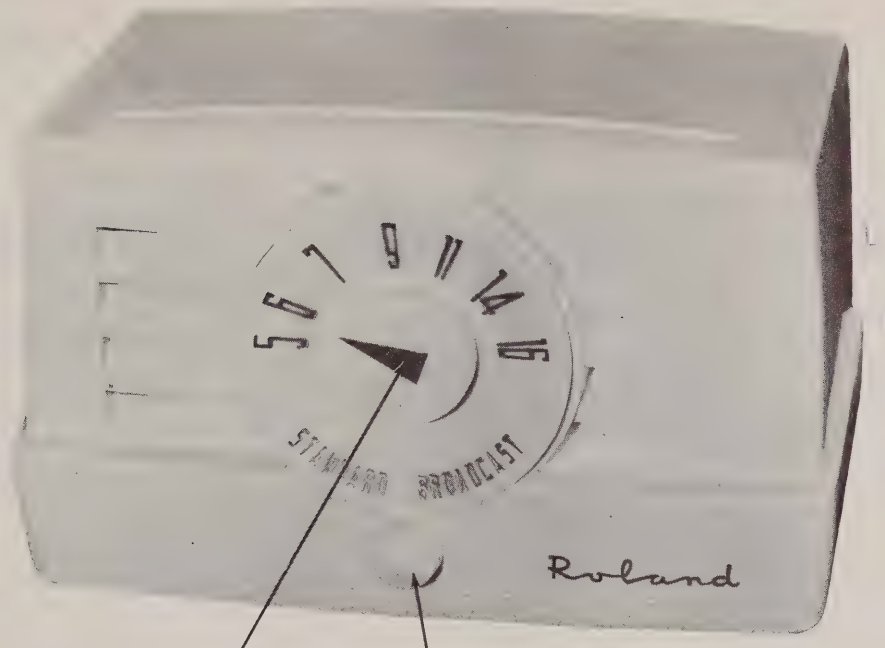
231-13

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

ROLAND
MODEL 5T3



PROPERTY OF
DENVER, COLORADO

ROLAND
MODEL 5T3

TRADE NAME	Roland Model 5T3
MANUFACTURER	Roland Radio Corp., 12-30 Anderson Ave., Mt.Vernon, N.Y.
TYPE SET	AC-DC Operated AM Superheterodyne Receiver
TUBES (Five)	Types 12BE6 Conv., 12BA6 IF Amp., 12AT6 Det.-AVC-AF Amp., 50C5 Audio Output, 35W4 Rectifier
POWER SUPPLY	110-120 Volts AC-DC RATING .25 Amp. @ 117 Volts AC
TUNING RANGE—BROADCAST	535-1620KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Use isolation transformer, if available. If not, connect a .1MFD capacitor in series with low side of signal generator and B-. Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.
To set pointer, turn tuning capacitor fully closed and set pointer parallel with base of dial.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.1MFD	High side to lug on antenna stator plates Low side to B-.	455KC (400~Mod)	Tuning gang fully open	Across voice coil	A1, A2	Adjust for maximum output. If isolation transformer is not used, reduce dummy antenna to .001MFD to reduce hum modulation.
2.		Loop	1620KC	"	"	A3	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3.		"	1400KC	Tune to 1400KC signal	"	A4	"

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PARTS LIST AND DESCRIPTIONS

ROLAND
MODEL 5T3

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		ROLAND PART No.	STANDARD REPLACEMENT		
V1	Converter	12BE6	12BE6	7CH	
V2	IF Amp.	12BA6	12BA6	7BK	
V3	Det-AVC-AF Amp.	12AT6	12AT6	7BT	
V4	Audio Output	50C5	50C5	7CV	
V5	Rectifier	35W4	35W4	5BQ	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP.	VOLT	ROLAND PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C1A	40	150		PRS150/40-		BBRT44215		3N532	TVA-3448	Red
B	40	150		40-40						Red
C	20	150								Green
C2	.05	400		P488-05	DF-503	PTE4S5		PT415	4TM-S5	
C3	150	500		1468-00015		5W5T15		MC236	1FM-315	
C4	150	500		1468-00015		5W5T15		MC236	1FM-315	
C5	.1	200		P288-1		PJ2P1		PT401	2TM-P1	
C6	150	500		1468-00015		5W5T15		MC236	1FM-315	
C7	.01	600		P688-01	D6-103	PTE6S1	GP2-333-103	PT611	6TM-S1	
C8	.01	600		P688-01	D6-103	PTE6S1	GP2-333-103	PT611	6TM-S1	
C9	.01	600		P688-01		PTE6S1		PT611	6TM-S1	
C10	.1	400		P488-1		PTE4P1		PT401	4TM-P1	

CONTROLS

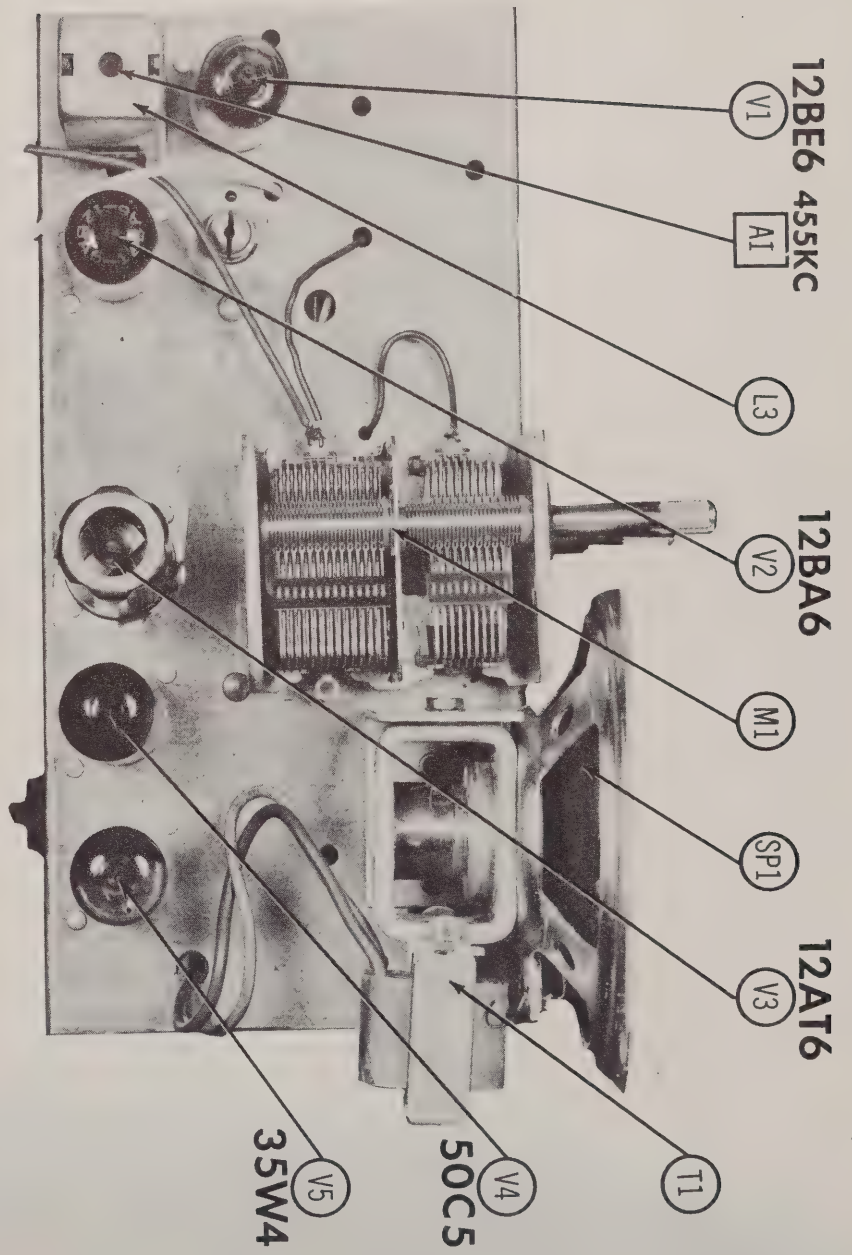
ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	ROLAND PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	
R1A	500KΩ	½	VC-51	Q13-133	AG-60-Z	BSK-60-S	U-48	Volume
B	Shaft		Not Req.	Not Req.	KSS-3	Not Req.	Not Req.	Attach to R1A
C	Switch		Not Req.	76-1	SWB	Not Req.	US-26	Attach to R1A

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	ROLAND PART No.	IRC PART No.	
R2	22KΩ	½		BTS-22K	
R3	4700Ω	1		BTA-4700	
R4	2.2Meg	½		BTS-2.2Meg	
R5	68KΩ	½		BTS-68K	
R6	4.7Meg	½		BTS-4.7Meg	

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	ROLAND PART No.	IRC PART No.	
R7	220KΩ	½		BTS-220K	
R8	470KΩ	½		BTS-470K	
R9	150Ω	1		BTA-150	
R10	1500Ω	1		BTA-1500	
R11	18Ω	½		BTS-18	

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA					NOTES
	IMPEDANCE		DC RES.		ROLAND PART No.	STANCOR PART No.	MERIT PART No.	Halldorson PART No.	TRIAD PART No.	
	PRI.	SEC.	PRI.	SEC.						
T1	2.16KΩ	3.3Ω	168Ω	.44Ω	P70D	A-3332 ①	A-3025 ①	Z1101 ①	S-2X ①	① Bend mounting tabs down, file out slots mount on original mounting bracket.

SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA			NOTES
	SIZE	FIELD	V. C. IMP.	ROLAND PART No.	VIKING PART No.	QUAM PART No.	
SP1	3"	PM	3.3Ω	SP-31	35J4	3A07	

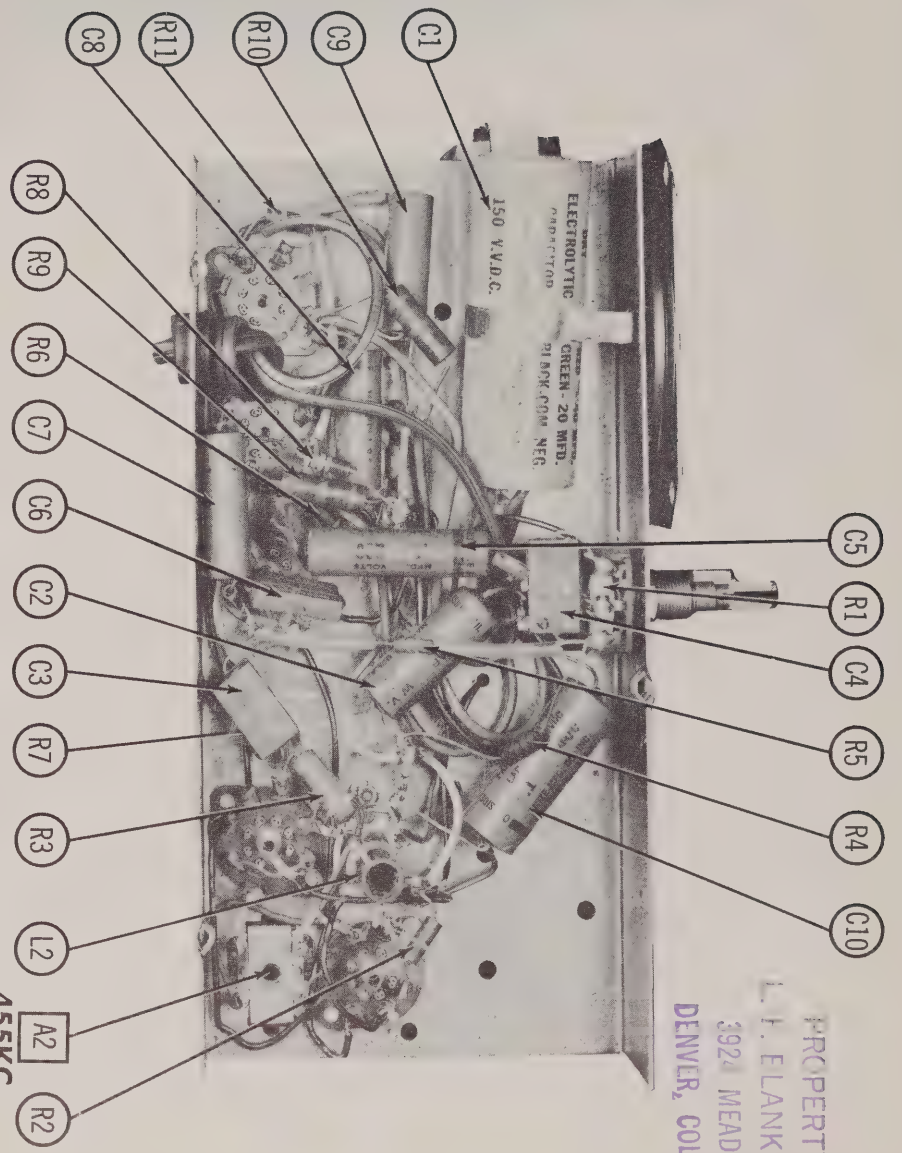
COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	ROLAND PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	Loop Ant.	2.8Ω		LP514			69-Osc.	
L2	Osc. Coil	.5Ω	5.5Ω		14-1073		12-C1	
L3	IF Trans.	19Ω	19Ω	LF-24	16-6758	BC-352		

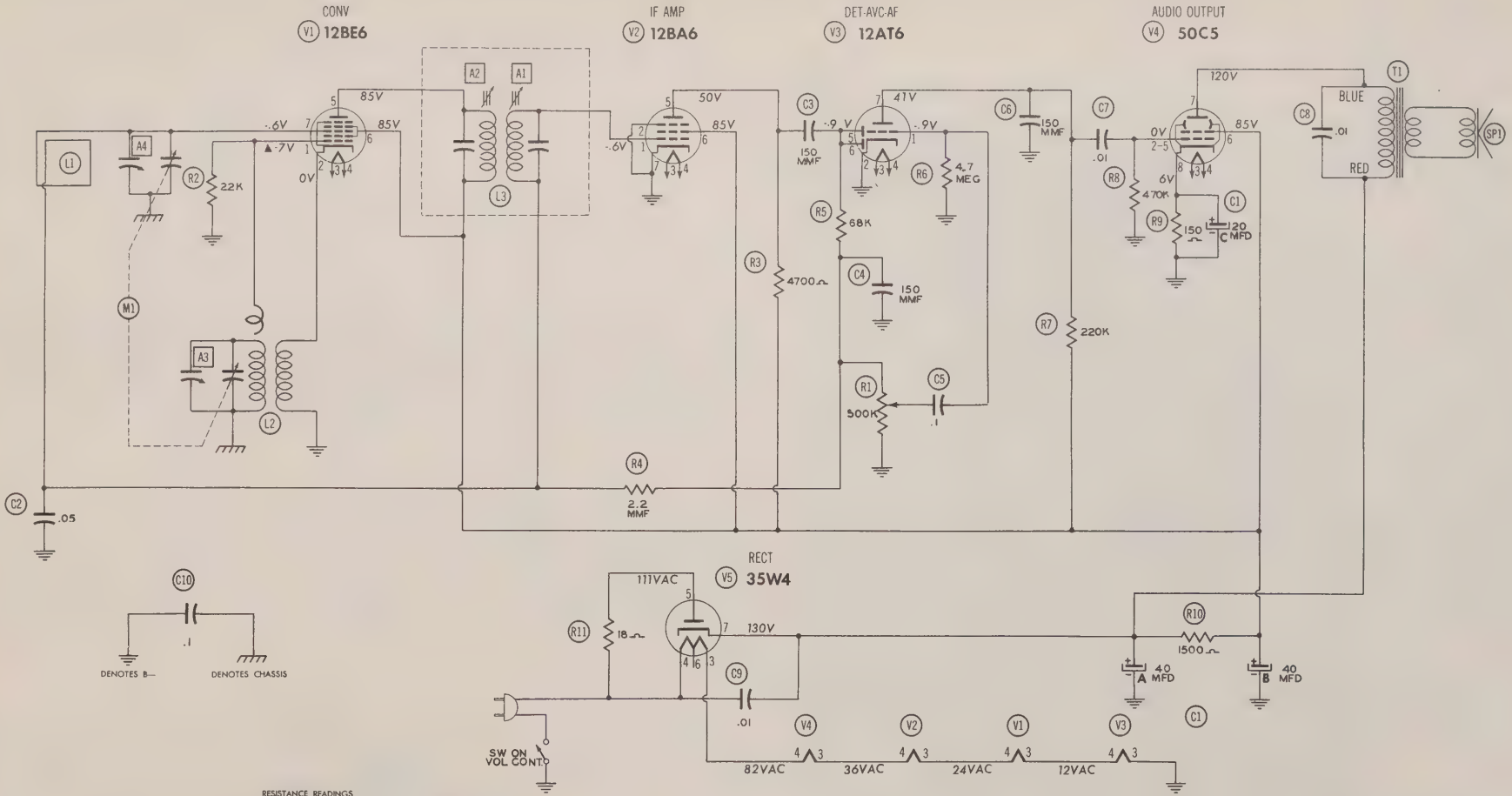
MISCELLANEOUS

ITEM No.	PART NAME	ROLAND PART No.	NOTES
M1	2 Gang Tuning Cap.		(29-457MMF, 32-190MMF)

CHASSIS—BOTTOM VIEW



ROLAND MODEL 5T3



RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V 1	12BE6	22KΩ	5.5Ω	14Ω	26Ω	†1.5KΩ	†1.5KΩ	2.7Meg
V 2	12BA6	2.7Meg	0Ω	26Ω	38Ω	†6.2KΩ	†1.5KΩ	0Ω
V 3	12AT6	500KΩ	0Ω	0Ω	14Ω	570KΩ	570KΩ	†220KΩ
V 4	50C5	150Ω	470KΩ	38Ω	88Ω	470KΩ	†1.5KΩ	†170Ω
V 5	35W4	INF	INF	88Ω	120Ω	130Ω	INF	200KΩ

† MEASURED FROM PIN 7 OF V5

IF=455KC

THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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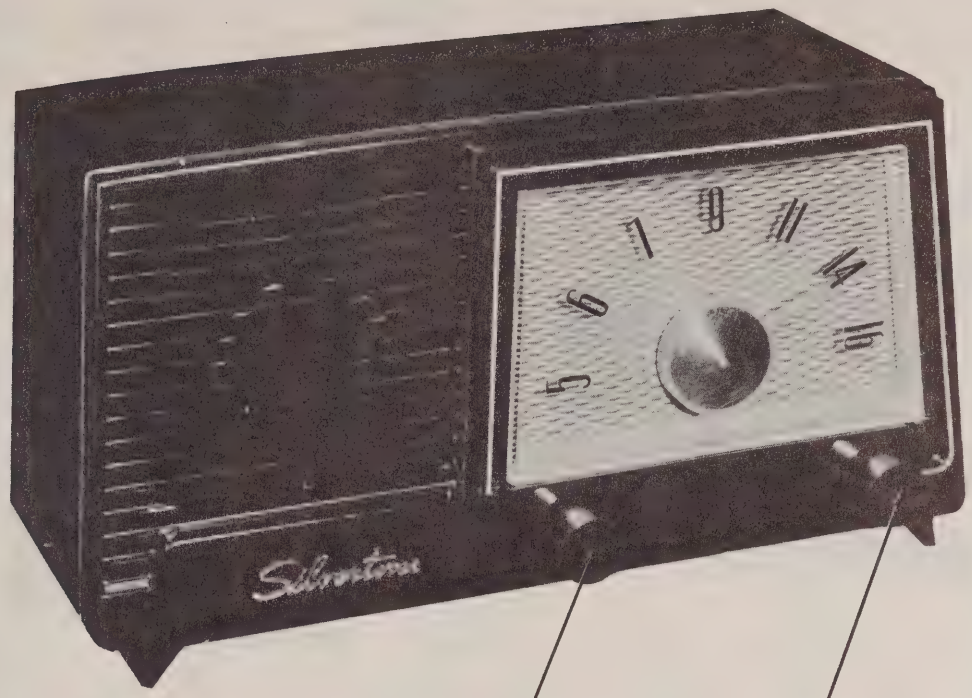
1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

SILVERTONE
MODEL 3004 (Ch. 757.130)



PROPERTY OF
DENVER, COLORADO

SILVERTONE
MODEL 3004 (Ch. 757.130)

TRADE NAME	Silvertone Model 3004 (Ch. 757.130)
MANUFACTURER	Sears Roebuck & Co., 925 S. Homan, Chicago, Ill.
TYPE SET	AC-DC Operated AM Superheterodyne Receiver
TUBES (Five)	Types 12BE6 Conv., 12BA6 IF Amp., 12AV6 (or) 12AT6 Det.-AVC-AF Amp., 50L6GT Audio Output 35W4 Rectifier
POWER SUPPLY	105-120 Volts AC-DC RATING .26 Amp. @ 117 Volts AC
TUNING RANGE—BROADCAST	535-1640KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To set pointer, turn tuning capacitor fully closed and set pointer to least reference mark at low frequency end of dial. Use isolation transformer, if available. If not, connect a .1MFD capacitor in series with low side of signal generator and B-. Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting. Loop should be maintained in same relative position to chassis as when receiver is in cabinet.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.05MFD	High side to pin 7 (grid) of 12BE6 (V1). Low side to chassis.	455KC (400~Mod)	Tuning gang fully open	Across voice coil	A1, A2, A3, A4	Adjust for maximum output. If isolation transformer is not used, reduce dummy antenna to .001MFD to reduce hum modulation.
2.		Loop	1640KC	"	"	A5	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3.		"	1400KC	Tune to 1400KC signal	"	A6	"
4.	Check calibration at 600KC and 1100KC. If necessary, repeat steps 2 and 3.						

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PARTS LIST AND DESCRIPTIONS

SILVERTONE
MODEL 3004 (Ch. 757.130)

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		SILVERTONE PART No.	STANDARD REPLACEMENT		
V1	Converter	12BE6	12BE6	7CH	
V2	IF Amp.	12BA6	12BA6	7BK	
V3A	Det-AVC-AF Amp.	12AV6	12AV6	7BT	
B	Det-AVC-AF Amp.	12AT6	12AT6	7BT	
V4	Audio Output	50L6GT	50L6GT	7S	
V5	Rectifier	35W4	35W4	5BQ	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP.	VOLT	Silvertone PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C1A	50	150	E325	PRS150/50-30		BBRD5315		TCD497	TVA-2450	Red Green
B	30	150								
C2	.05	400	E306	P488-05	DF-503	PTE4S5		PT415	4TM-S5	
C3A	220		*E3015	*PA-113-1	*PC-150		*1408-01		*103C4	
B	2000									
C	5000									
D	250									
E										
C4	.01	600	E301	P688-01	D6-103	PTE6S1		PT611	6TM-S1	
C5	.047	400	E342	489ZX-047		PJ4S47		PT4147	4TM-S47	
C6	.05	400	E306	P488-05		PTE4S5		PT415	4TM-S5	

* Items C3A, C3B, C3C, C3D, C3E, R5A, R5B and R5C are combined in one unit.
When replacing items separately C3D and C3E should total 250MMF.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	SILVERTONE PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	
R1A	500K	½	E254	Q13-133	AG-60-Z	BSK-60-S	U-48	Volume
B	Shaft		Not Req.	Not Req.	KSS-3	Not Req.	Not Req.	Attach to R1A
C	Switch		Not Req.	76-1	SWB	Not Req.	US-26	Attach to R1A

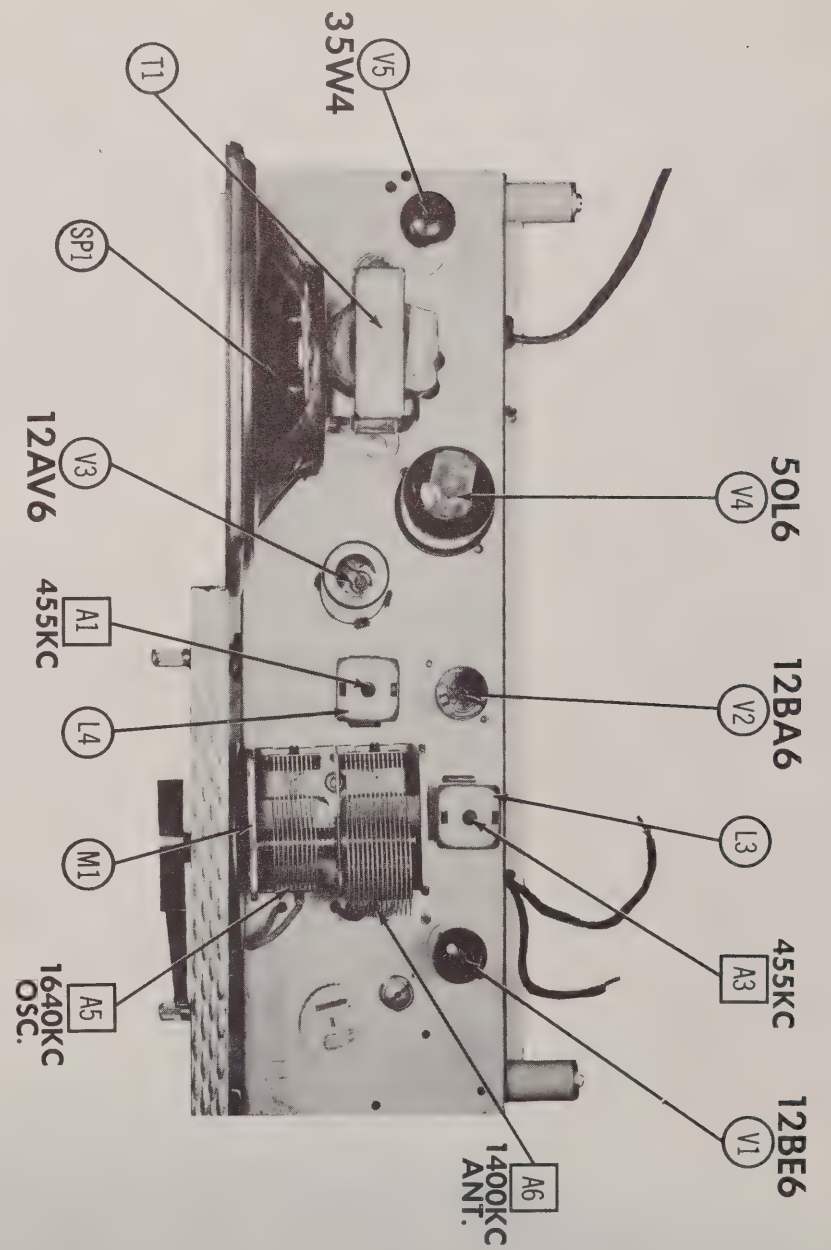
RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	SILVERTONE PART No.	IRC PART No.	
R2	22KΩ	½	* E3015	BTS-22K	
R3	180Ω	½		BTS-180	
R4	3.3Meg	½		BTS-3.3Meg	
R5A	6.8Meg	½		BTS-6.8Meg	
B	470KΩ	½		BTS-470K	
C	470KΩ	½		BTS-470K	

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	SILVERTONE PART No.	IRC PART No.	
R6	120Ω	½		BTS-120	
R7	1500Ω	1		BTA-1500	
R8	22Ω	½		BTS-22	

* Items R5A, R5B, R5C, C3A, C3B, C3C, C3D, C3E are combined in one unit.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA					NOTES
	IMPEDANCE		DC RES.		Silvertone PART No.	STANCOR PART No.	MERIT PART No.	Halldorson PART No.	TRIAD PART No.	
	PRI.	SEC.	PRI.	SEC.						
T1	2.2KΩ	3.6Ω	236Ω tap ⓐ 13Ω	.62Ω	Part of Spkr.	A-3330 ①	A-3031	Z1102		① Drill one new mounting hole.

SPEAKER

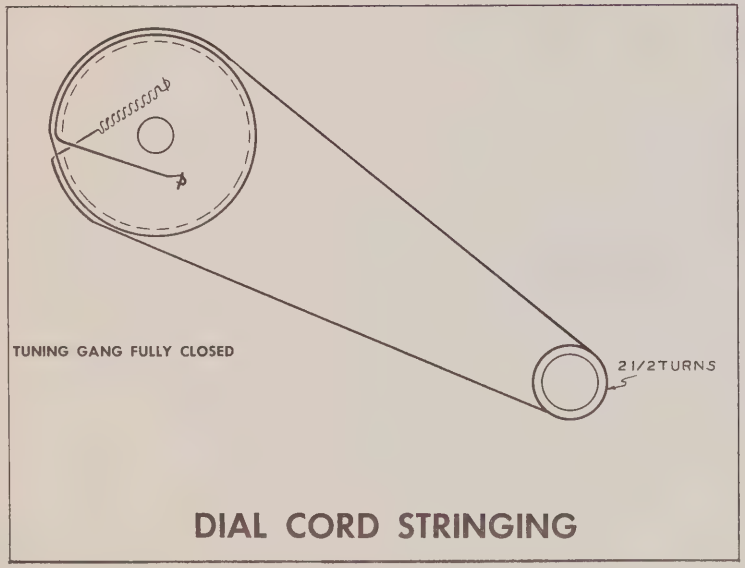
ITEM No.	RATINGS			REPLACEMENT DATA			NOTES
	SIZE	FIELD	V. C. IMP.	Silvertone PART No.	JENSEN PART No.	QUAM PART No.	
SP1	5 1/4"	PM	3.6Ω	E105	ST-803 Mod. P525-V	52A1	

COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	SILVERTONE PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	Loop Ant.	0Ω	3.2Ω	E603				Includes cabinet back
L2	Osc. Coil	.5Ω	5.5Ω	E619	14-1073		69-Osc.	
L3	Input IF	17Ω	17Ω	E622	16-6758	BC-352	12-C1	
L4	Output IF	17Ω	17Ω	E622	16-6758	BC-353	12-C2	

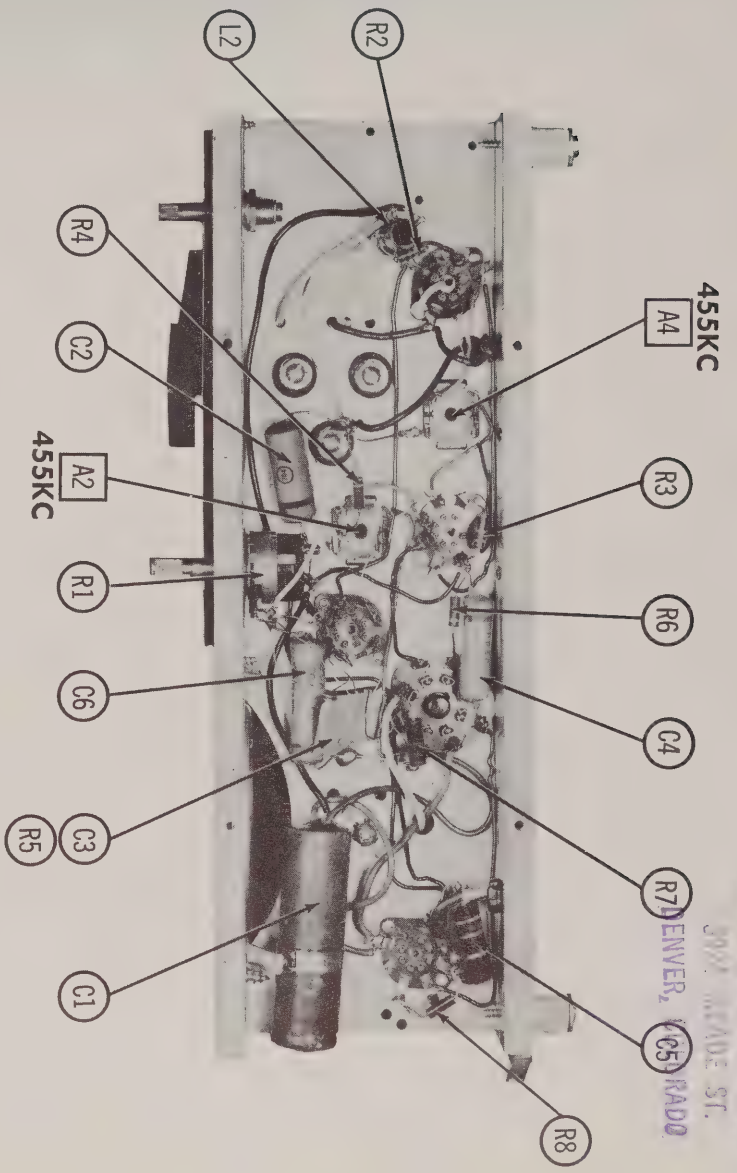
MISCELLANEOUS

ITEM No.	PART NAME	SILVERTONE PART No.	NOTES
M1	Tuning cap	E356	2 section (35-452MMF, 22-19MMF)
	Cabinet	E7010	Brown
	Cabinet	E7011	Ivory
	Knob	E509B	(2) brown
	Knob	E509I	(2) ivory
	Knob	E509G	(2) green
	Pointer	E454	
	Window	E716	Styrene
	Dial Pan.	E4020	



DIAL CORD STRINGING

CHASSIS—BOTTOM VIEW



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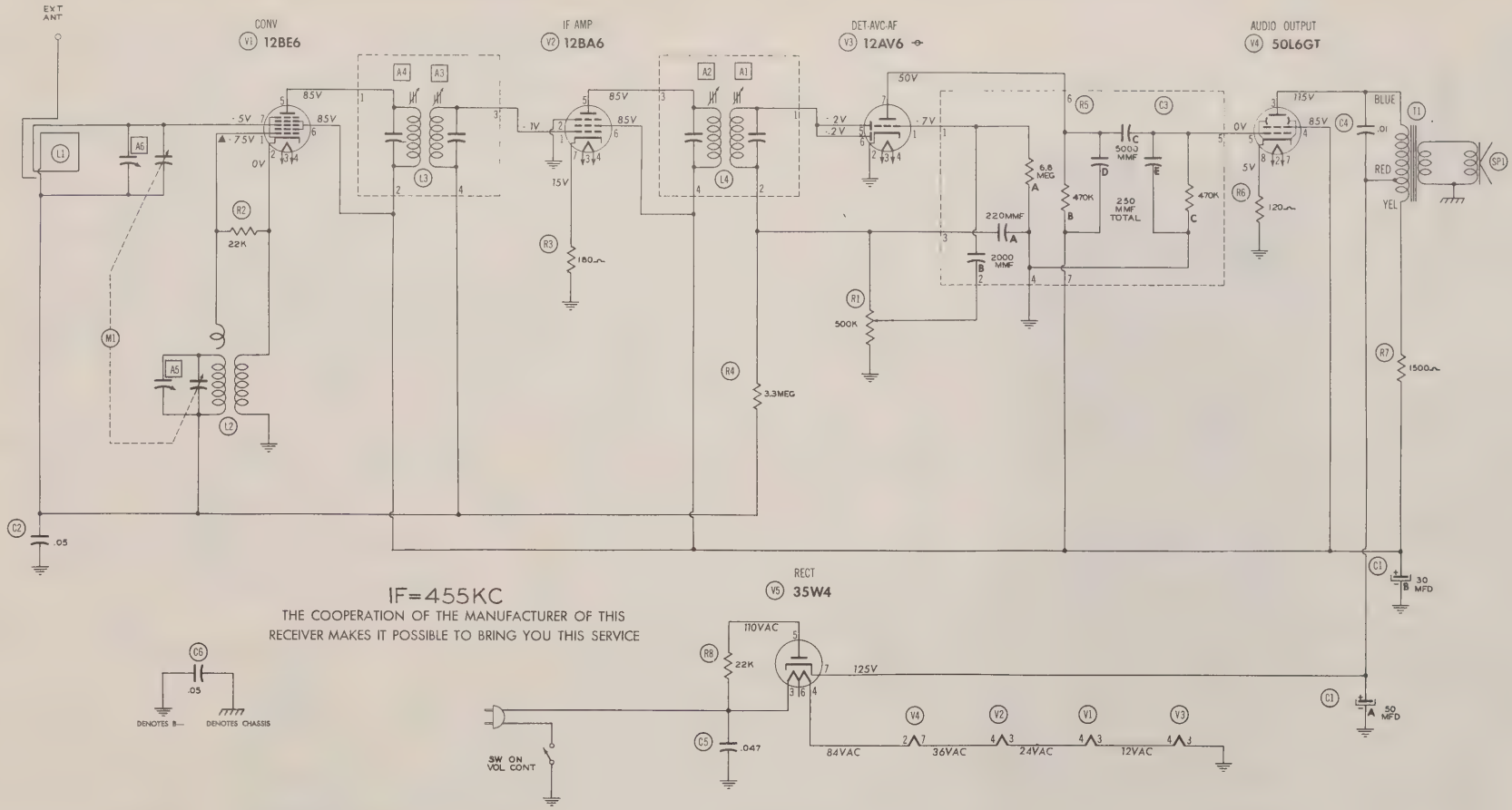

⊖ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
V 1	12BE6	22KΩ	.5Ω	13Ω	26Ω	†1.5KΩ	†1.5KΩ	3.8Meg	
V 2	12BA6	3.8Meg	0Ω	26Ω	39Ω	†1.5KΩ	†1.5KΩ	180Ω	
V 3	12AV6	6.8Meg	0Ω	0Ω	13Ω	500KΩ	500KΩ	†470KΩ	
V 4	50L6GT	INF	130Ω	†225Ω	†1.5KΩ	470K Ω	†13Ω	39Ω	120Ω
V 5	35W4	0Ω	0Ω	190Ω	130Ω	210Ω	140Ω	60KΩ	

† MEASURED FROM PIN 7 OF V5

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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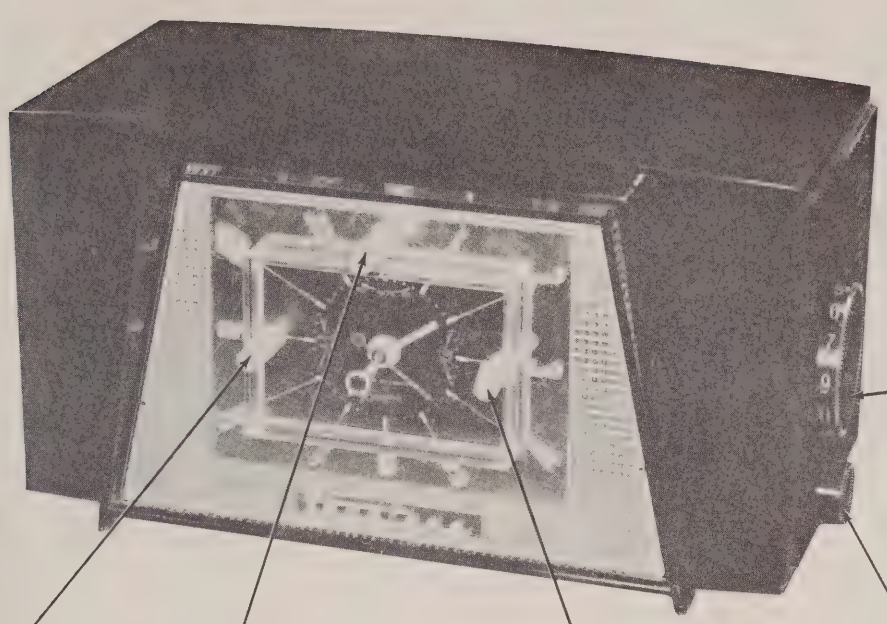
1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

TRUETONE
MODEL D2389



TRUETONE
MODEL D2389

TRADE NAME	Truetone Model D2389
SUPPLIER	Western Auto Supply Co., 2107 Grand Ave., Kansas City, Mo.
TYPE SET	AC Operated AM Superheterodyne Receiver with Electric Clock
TUBES (Four)	Types 12BE6 Conv., 12AT6 Det.-AVC-AF Amp., 50B5 Audio Output, 35W4 Rectifier
POWER SUPPLY	105-120 Volts AC-60 Cycles — RATING .23 Amp. @ 117 Volts AC
TUNING RANGE—BROADCAST	535-1620KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Use isolation transformer, if available. If not, connect a .1MFD capacitor in series with low side of signal generator and B-. Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.1MFD	High side to pin 7 (grid) of 12BE6 (V1). Low side to B-.	455KC (400∿Mod)	Tuning gang fully open	Across voice coil	A1, A2	Adjust for maximum output. If isolation transformer is not used, reduce dummy antenna to .001MFD to reduce hum modulation.
2.	45MMF	High side to antenna terminal of L1 (Ant. coil). Low side to B-	1620KC	"	"	A3	Remove antenna bank. Adjust for maximum deflection.
3.	"	"	1500KC	Tune to 1500KC signal	"	A4	"
4.	"	"	600KC	Tune to 600KC signal	"		If necessary, fan slotted rotor plates on tuning gang. Repeat steps 2, 3 and 4

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PARTS LIST AND DESCRIPTIONS

TRUETONE MODEL D2389

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		TRUETONE PART No.	STANDARD REPLACEMENT		
V1	Converter	12BE6	12BE6	7CH	
V2	Det-AVC-AF Amp.	12AT6	12AT6	7BT	
V3	Audio Output	50B5	50B5	7BZ	
V4	Rectifier	35W4	35W4	5BQ	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP.	VOLT	TRUETONE PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C1A	70	150	150-107	PRS150/80-40		BBRD8415		3N536	TVA-246	Red Blue
B	30	150								
C2	.05	400	152-104	P288-05	DF-503	PJ2S5		PT415	2TM-S5	
C3	.002									Note 1
C4	100		156-102	SI100	D6-101	TM5T1	GP1K-101	UC-531	5GA-T1	
C5	2000		158-103	BPD-002	DD-202	TM5D2	812-002	DC-522	5HK-D2	
C6	330	500		1479-00035		5R5T3		MC-241	1FM-335	Note 2
C7	10000			BPD-01	DD-103	TM5S1	811-01	DC-511	5HK-S1	
C8	20000			BPD-02	DD-203	TM5S2		DC-512	5HK-S2	
C9	.047	400		P488-047		PTE4S47		PT4147	4TM-S47	
C10	.1	400	152-108	P488-1		PTE4P1		PT401	4TM-P1	

Note 1. Not used in all Models.
Note 2. Not used in all Models.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	TRUETONE PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	
R1A	2Meg with 100K stop	½	120-105	Q13-139 *	AG-66-Z *	AB-76 *	U-55 *	Volume - Note 1
B	Shaft		Not Req.	Not Req.	KSS-3	AK-4	Not Req.	Attach to R1A

Note 1. Some models may use alternate control part # 120-104.
* Connect a 100KΩ resistor in series with the right hand terminal of the control and the lead connecting to the same terminal of the original control (control viewed from shaft end, terminals down).

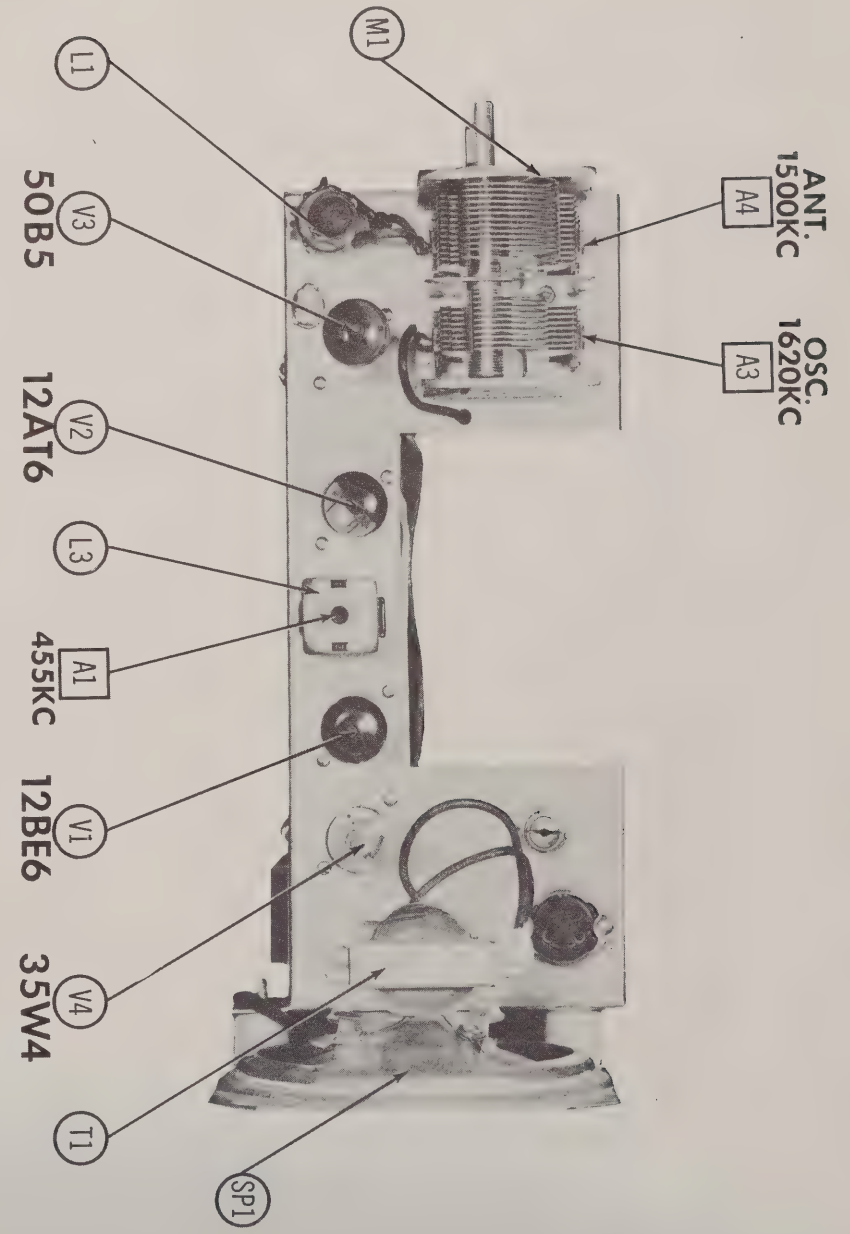
RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	TRUETONE PART No.	IRC PART No.	
R2	22KΩ	½		BTS-22K	Note 1
R3	4.7Meg	½	180-122	BTS-4.7 Meg	
R4	10Meg	½	180-123	BTS-10Meg	
R5	370KΩ	½			Note 2

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	TRUETONE PART No.	IRC PART No.	
R6	370KΩ				Note 2
R7	2200Ω	1	180-124	BTA-2200	
R8	18Ω	½		BTS-18	
R9	68Ω	1	180-125		

Note 1. Some models may use a 6000Ω and a 15KΩ resistor in this application.
Note 2. Some models may use a 330KΩ resistor in this application.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA					NOTES
	IMPEDANCE		DC RES.		TRUETONE PART No.	STANCOR PART No.	MERIT PART No.	Halldorson PART No.	TRIAD PART No.	
	PRI.	SEC.	PRI.	SEC.						
T1	2.4KΩ	3.1Ω	146Ω	53Ω	Part of speaker	A-3332	A-3025	Z-1101	S-1X ①	① Drill one new mtg. hole.

SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA			NOTES
	SIZE	FIELD	V. C. IMP.	TRUETONE PART No.	JENSEN PART No.	QUAM PART No.	
SP1	4"	PM	3.1Ω	170-105	ST-113 Mod P4-X	4A07	

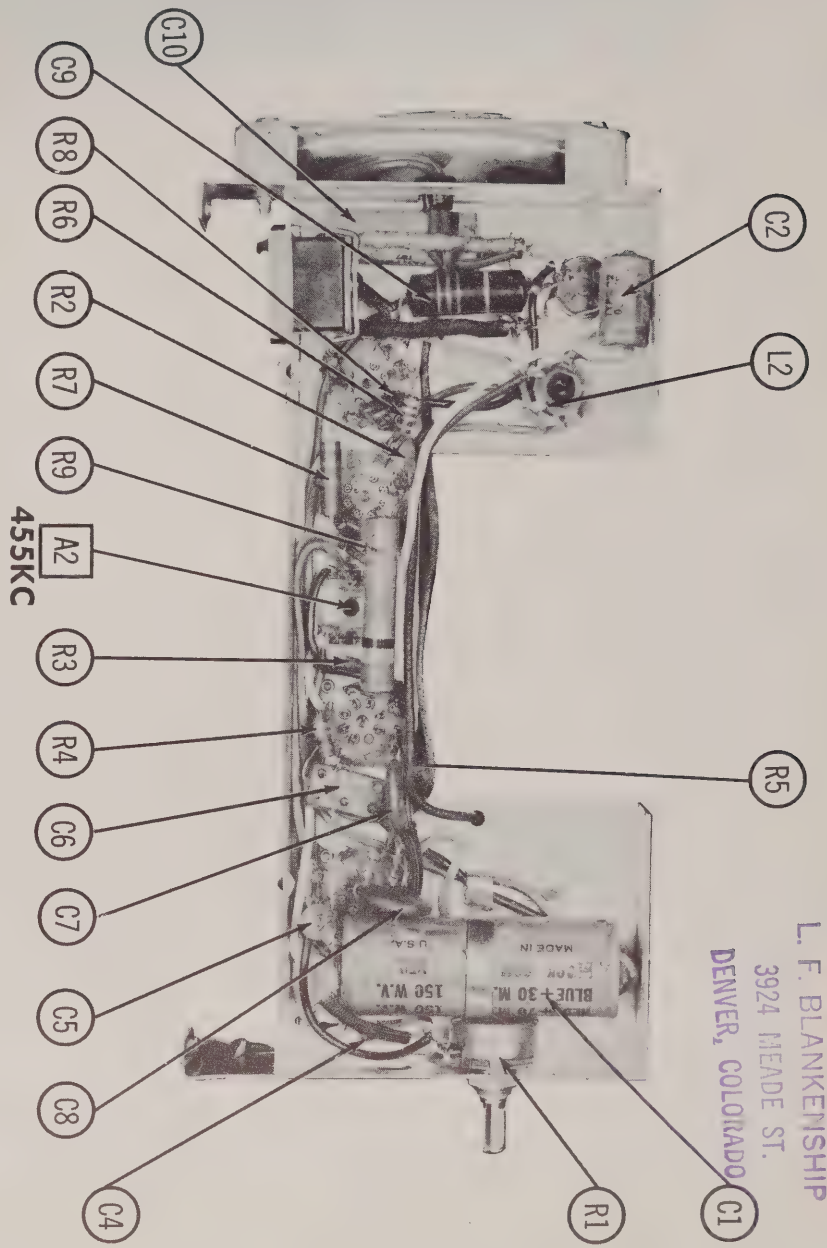
COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	TRUETONE PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	Ant. Coil	75Ω	2.5Ω	132-104				
L2	Osc. Coil	.4Ω	5.5Ω	136-106	14-1073		69-Osc.	
L3	IF Trans.	18Ω	19Ω	130-103				Pri. tapped @ 2.5Ω

MISCELLANEOUS

ITEM No.	PART NAME	TRUETONE PART No.	NOTES
M1	Tuner	160-104	2 gang (34-457MMF) (29- 200MMF)
M2	Clock	207-101	
	Cabinet	210-104	Ebony
	Knob	220-104E	Ebony - volume
	Knob	220-103E	Ebony - tuning
	Knob	207-102	Clear plastic (3) clock
	Face	206-102G	Gold foil
	Face	206-102R	Red foil

CHASSIS—BOTTOM VIEW



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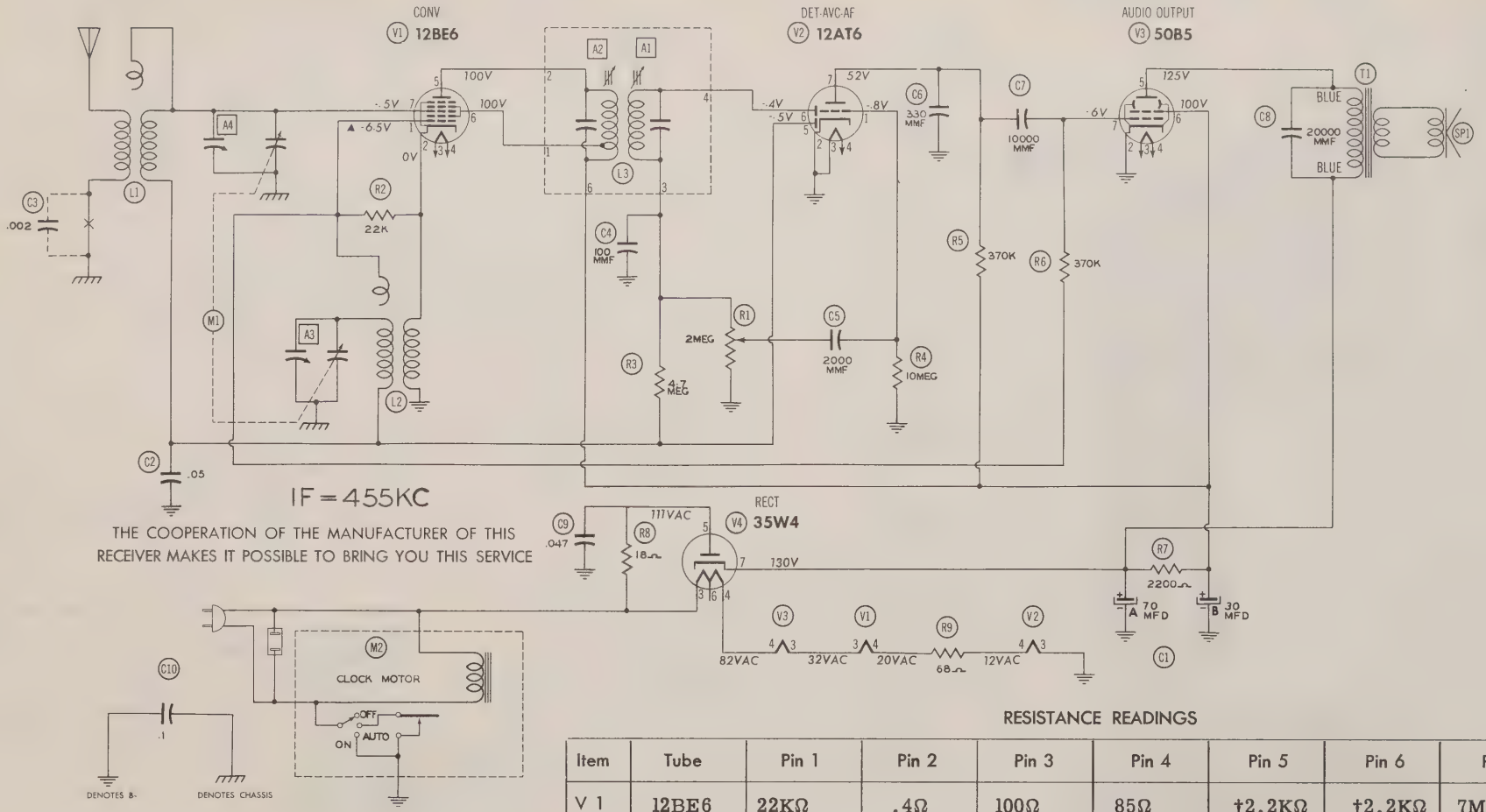
3924 MEADE ST.
DENVER, COLORADO

TRUETONE MODEL D2389



RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V 1	12BE6	22KΩ	.4Ω	100Ω	85Ω	†2.2KΩ	†2.2KΩ	7Meg
V 2	12AT6	10Meg	0Ω	0Ω	12Ω	7Meg	2Meg	†370KΩ
V 3	50B5	400KΩ	0Ω	100Ω	170Ω	†150Ω	†2.2KΩ	400KΩ
V 4	35W4	0Ω	400KΩ	210Ω	170Ω	230Ω	160Ω	60KΩ

† MEASURED FROM PIN 7 OF V4

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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1- DC voltage measurements are at 20,000 ohms per volt, AC voltages measured at 1000 ohms per volt.
2- Socket connections are shown as bottom views.
3- Measured values are from socket pin to common negative.
4- Line voltage maintained at 117 volts for voltage readings.
5- Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6- Volume control at maximum, no signal applied for voltage measurements.

TURNER
MODEL TV-3 (UHF Conv)

PROPERTY OF
L. F. BL[illegible]
3924 [illegible]
DENVER, COLORADO

TURNER
MODEL TV-3 (UHF Conv)

TRADE NAME	Turner Model TV-3
MANUFACTURER	The Turner Co., Cedar Rapids, Iowa
TYPE SET	AC Operated All Channel UHF Converter
TUBES (Three)	Types 6AF4 UHF Conv., 6BQ7A (or) 6BQ7A (or) 6BZ7 IF Amp., 6X4 Rectifier
POWER SUPPLY	110-120 Volts AC-50/60 Cycles RATING .05 Amp. @ 117 Volts AC
TUNING RANGE	Channels 14 thru 83

THIS UNIT HAS BEEN PROPERLY ALIGNED AT THE FACTORY AND SHOULD NOT REQUIRE ALIGNMENT IN THE FIELD. IF THE TUNER SHOULD BECOME DEFECTIVE OR REQUIRE ALIGNMENT RETURN THE TUNER TO THE FACTORY.

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

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PARTS LIST AND DESCRIPTIONS

TURNER
MODEL TV-3

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA: TURNER PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RETMA BASE TYPE	NOTES
V1	UHF Oscillator	6AF4	6AF4	7DK	
V2A	IF Amplifier	6BQ7A	6BQ7A	9AJ	
B	IF Amplifier	6BZ7	6BZ7	9AJ	
V3	Rectifier	6X4	6X4	5BS	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: TURNER PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C1A	▲50	300		AFH2-33		BO26			TVL-2579	
B	▲50	300								
C2	470			BPD-00047	DD-471		GP2K-471	UC-5347	5GA-T47	
C3	100			BPD-0001	D6-101	TM5T1	GP2K-101	UC-531	5GA-T1	
C4	470									
C5	470			BPD-00047	DD-471		GP2K-471	UC-5347	5GA-T47	
C6	470			BPD-00047	DD-471		GP2K-471	UC-5347	5GA-T47	
C7	650									
C8	650									
C9A	800									
B	800									

RESISTORS

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: TURNER PART No.	REPLACEMENT DATA: IRC PART No.	NOTES
R1	5600Ω	1		BTA-5600	
R2	8200Ω	2		BTB-8200	
R3	1Meg	½		BTS-1Meg	
R4	100Ω	½		BTS-100	

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: TURNER PART No.	REPLACEMENT DATA: IRC PART No.	NOTES
R5	27Ω	½		BTS-27	
R6	1000Ω	½		BTS-1000	
R7	1000Ω	1		BTA-1000	
R8	680K	½		BTS-680K	

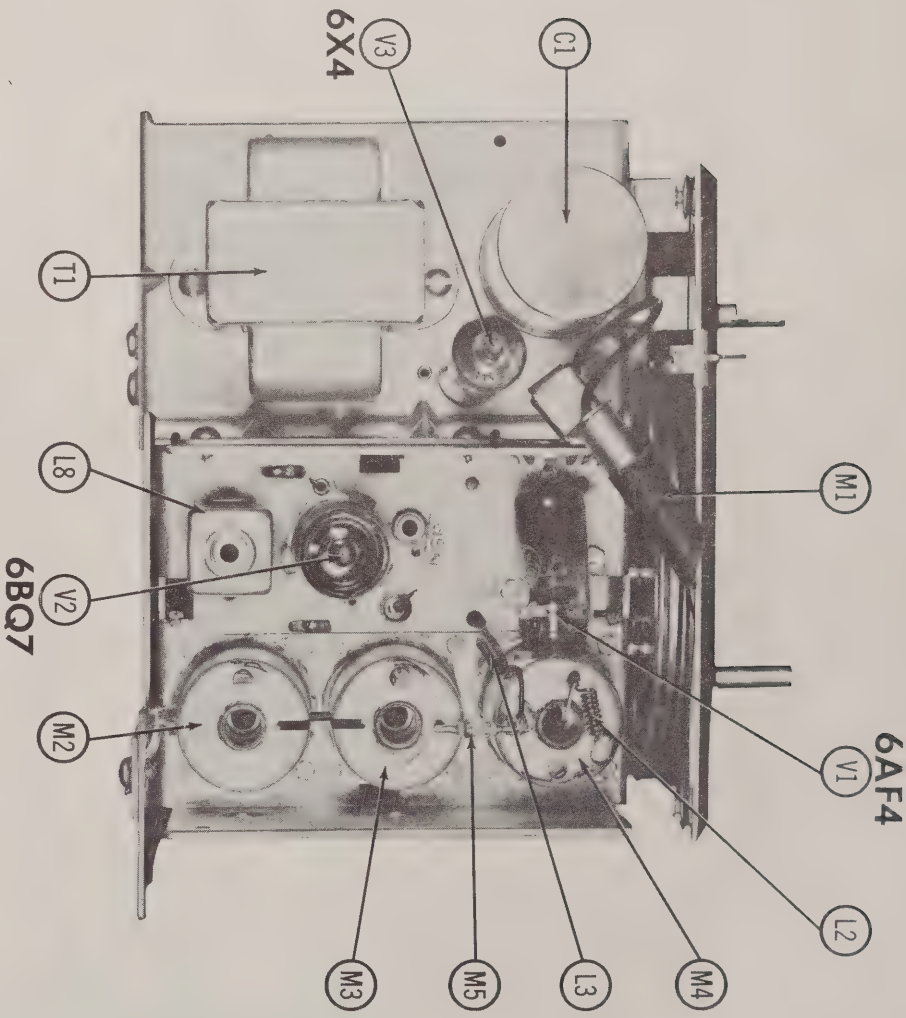
TRANSFORMER (POWER)

ITEM No.	RATING: PRI.	RATING: SEC. 1	RATING: SEC. 2	RATING: SEC. 3	REPLACEMENT DATA: TURNER PART No.	STANCOR PART No.	MERIT PART No.	Halldorson PART No.	TRIAD PART No.
T1	117VAC @.05A	490VCT .006ADC	6.3VAC @1.2A						

COILS (RF-IF)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA: TURNER PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L1	Fil. Choke	0Ω						
L2	Fil. Choke	0Ω						
L3	UHF IF Coupling	0Ω						
L4	RF Choke	0Ω						
L5	RF Choke	.2Ω						
L6	UHF IF Input tuning	0Ω						
L7	Feedback Coil	.2Ω						
L8	UHF IF Output Trans.	0Ω	0Ω					Includes capacitors

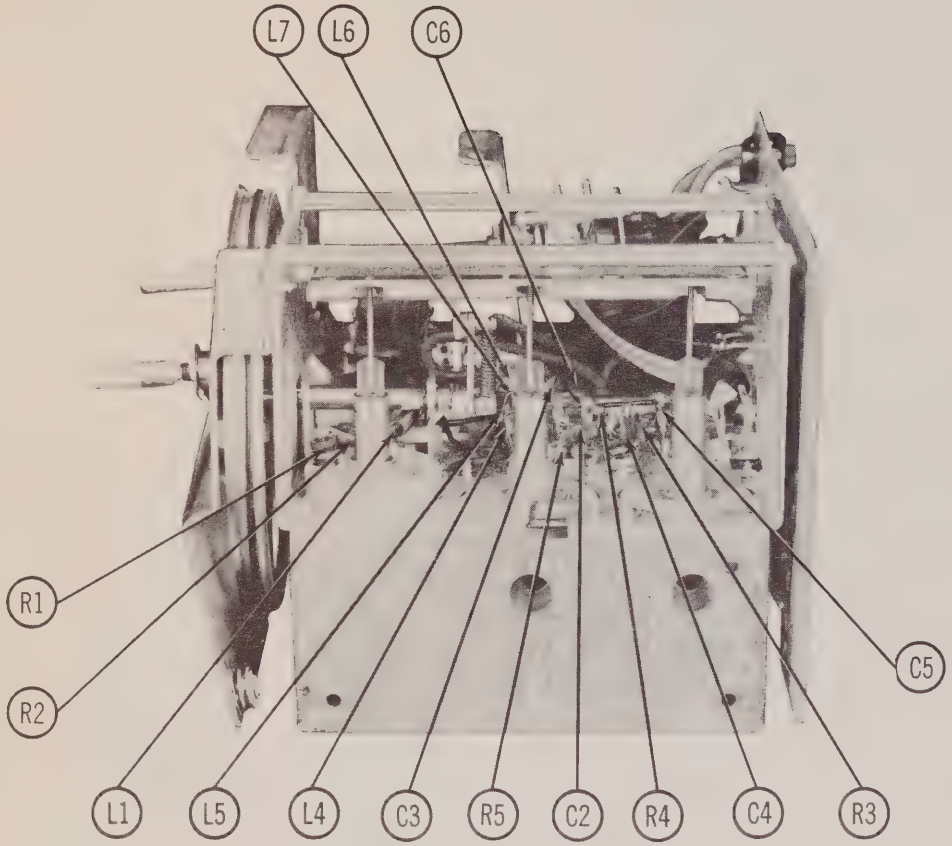
CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

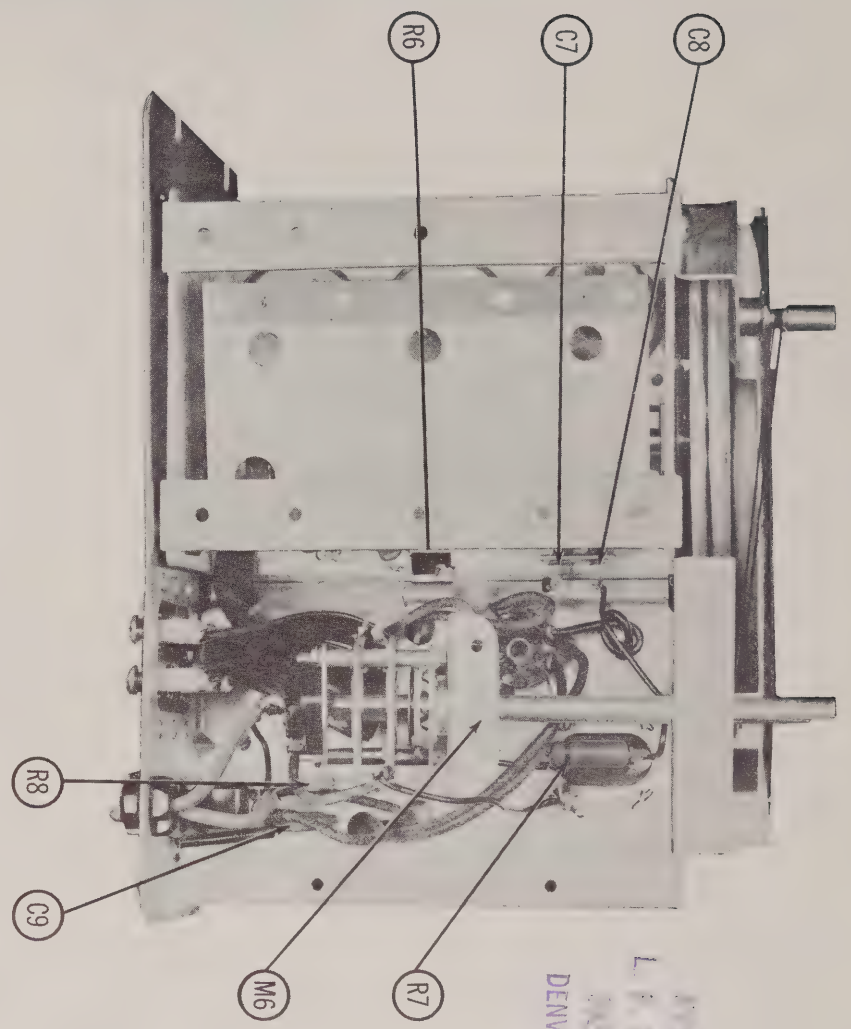
MISCELLANEOUS

ITEM No.	PART NAME	TURNER PART No.	NOTES
M1	Dial light		# 47 bayonet
M2	Tuning cavity		Capacity tuned
M3	Tuning cavity		Capacity tuned
M4	Tuning cavity		Capacity tuned
M5	Crystal		1N82
M6	Switch		Function selector-rotary 3 position-2deck



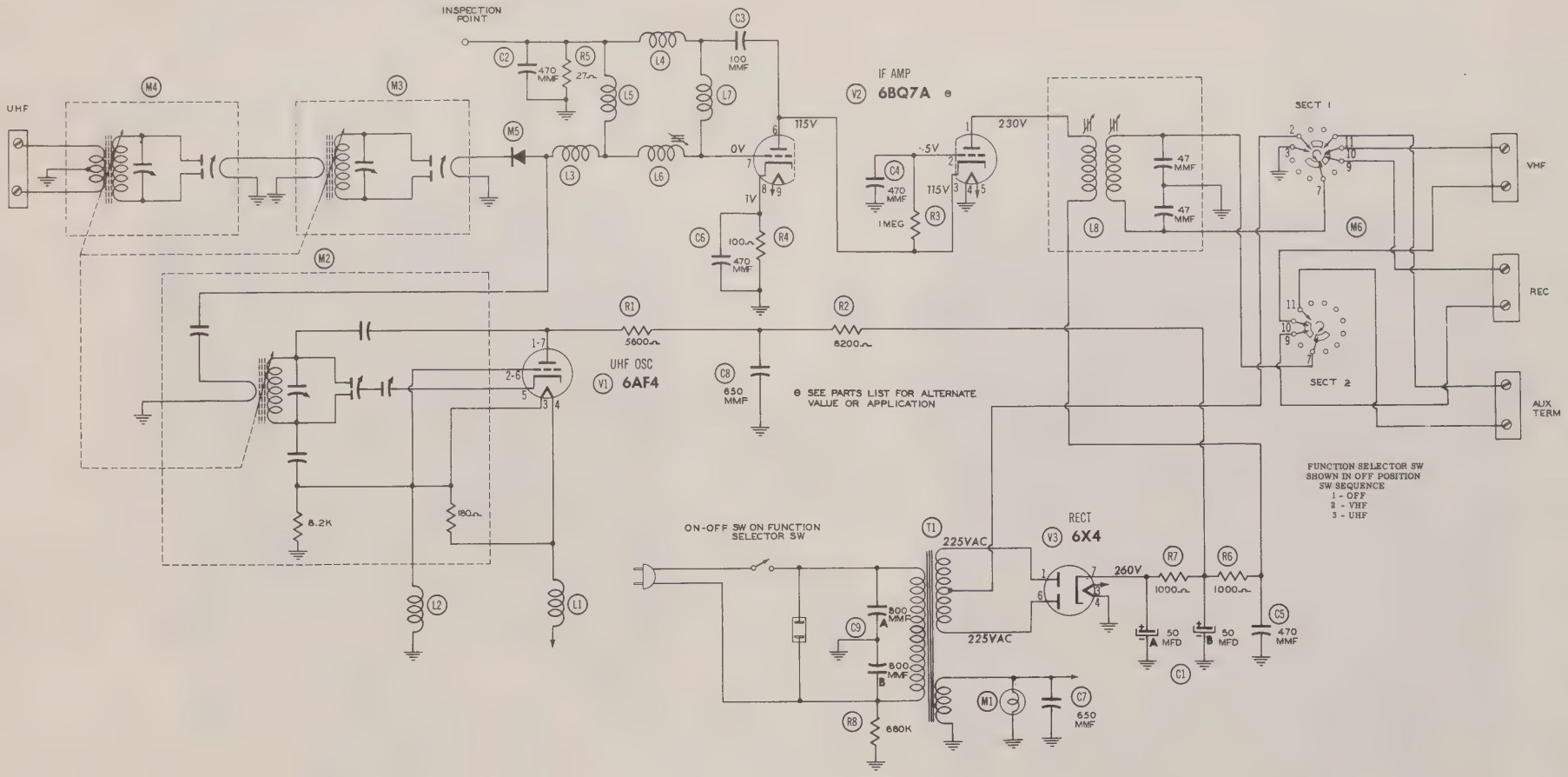
CHASSIS—SIDE VIEW

CHASSIS—BOTTOM VIEW



PROPERTY OF
L. B. WANKENSHIP
DENVER, COLORADO

TURNER MODEL TV-3



RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6AF4	†15KΩ	8.2KΩ	.3Ω	0Ω	0Ω	8.2KΩ	†15KΩ		
V 2	6BQ7A	†2KΩ	INF	INF	0Ω	.3Ω	INF	27Ω	100Ω	0Ω
V 3	6X4	620Ω	.3Ω	.3Ω	0Ω	INF	670Ω	100KΩ		

ALL READINGS IN UHF POSITION
■ MEASURED FROM PIN 3 OF V2

THE COOPERATION OF THE MANUFACTURER OF THIS EQUIPMENT MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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231-17

1 - DC voltage measurements are at 20,000 ohms per volt, AC voltages measured at 1000 ohms per volt.
2 - Socket connections are shown as bottom views.
3 - Measured values are from socket pin to common negative.
4 - Line voltage maintained at 117 volts for voltage readings.
5 - Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6 - No signal applied.

WEBSTER-ELECTRIC
MODEL 906

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST
DENVER, COLORADO

WEBSTER-ELECTRIC
MODEL 906

TRADE NAME	Webster Electric "Teletalk" Model 906
MANUFACTURER	Webster Electric Co., Racine Wis.
TYPE SET	AC Operated Intercommunication System Master Unit
TUBES (Four)	Types 6AV6 Pre-Amp., 6AU6 (or) 6BH6 AF Amp., 6AQ5 Audio Output, 6X4 Rectifier
POWER SUPPLY	110-120 Volts AC RATING .33 Amp. @ 117 Volts AC

ADJUSTMENTS

Two semifixed controls are provided in this equipment so that the amplifier may be adjusted for maximum output without feed-back howl or squeal. These semifixed volume adjustment controls are located on the back of the chassis, the one closest to the center of the chassis providing output adjustment for regular low volume operation, and the one closest to the end of the chassis providing output adjustment for high volume operation when the High-Power switch is pressed. Both of these controls are adjusted for maximum output by the factory, but as tubes age it may be necessary to make a readjustment to bring the output back to normal. The following adjustment procedure should be used:

1. Allow the unit to warm up for at least one hour after it is turned on.

2. Jumper the green wire pair (incoming voice line) in the junction box to the terminals of an unused voice pair. If all voice pair terminals in the junction box are used, disconnect one of the pairs or run a jumper pair between the green pair and the terminals to the longest circuit. Be sure to connect the dark green wire to the terminal having the colored wire running to the unit, and the light green wire to the white wire terminal.

3. Trip up the selector key on the line to which the green wire pair has been connected and note that the pilot busy signal light goes out as soon as the selector key on the line is tripped up. Then, tap the microphone on top of the cabinet. The sound should come from the speaker in the same cabinet. Turn the volume control on the front panel to the full volume position, that is, as far to the right as it will go without turning the unit off.

4. Use a screwdriver to turn the low volume adjustment clockwise until a feedback howl or squeal is heard. Then turn the control counter clockwise slowly until the howl or squeal disappears. Place the flat of your hand about three inches above the microphone; if the squeal or howl comes in again, turn the control as little as possible to make it cease. During this adjustment do not stand over or in front of the unit. This completes the low volume adjustment.

5. Make the high volume adjustment in the same manner, but with the "High Power" lever, located on the front of the cabinet, depressed.

6. Disconnect the jumper wires from the terminals selected and reconnect the interstation wires if they were disconnected. Each individual Master station in the system may be readjusted in the same manner.

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PARTS LIST AND DESCRIPTIONS

WEBSTER ELECTRIC
" TELETALK" MODEL 906

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA: Webster Electric PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RETMA BASE TYPE	NOTES
V1	Pre. Amplifier	6AV6	6AV6	7BT	
V2A	AF Amplifier	6AU6	6AU6	7BK	
B	AF Amplifier	6BA6	6BH6	7CM	
V3	Audio Output	6AQ5	6AQ5	7BZ	
V4	Rectifier	6X4	6X4	5BS	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING CAP.	RATING VOLT	REPLACEMENT DATA: Webster Electric PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C1A	■50	350		AFH3-28		CO22		FP330.7		
B	▲10	350								
C2	4	250		PRS150/4		BR415		TC40	TVA-1402	
C3	150			SI150	D6-151	TM5T15	GP2K-151	UC-5315	5GA-T15	
C4	.002	600		P688-002	D6-202	PTE6D2	GP2-333-202	PT622	6TM-D2	
C5	.02	400		P488-02		PTE4S2		PT412	4TM-S2	
C6	.005	600		P688-005		PTE6D5		PT625	6TM-D5	
C7	.047	400		P488-047	DF-503	PTE4S47		PT4147	4TM-S47	
C8	.25	200		P288-25		PTE4P15		PT4025	2TM-P25	

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA: Webster Electric PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	100Ω	2	211-15082			V-121	R100L	Volume
B	Shaft		Not Req.			Not Req.	DS36	Attach to R1A
C	Switch		Not Req.			K-10	US30	Attach to R1A
R2A	1500Ω	½	211-15060	Q11-110	AG-11-S	AB-6	U-6	Low volume
B	Shaft		Not Req.	Not Req.	FKS-1/4	AK-1	Not Req.	Attach to R2A
R3A	1000Ω	½	211-15060-1	Q11-108	AG-8-S	AB-5	U-4	High volume
B	Shaft		Not Req.	Not Req.	FKS-1/4	AK-1	Not Req.	Attach to R3A

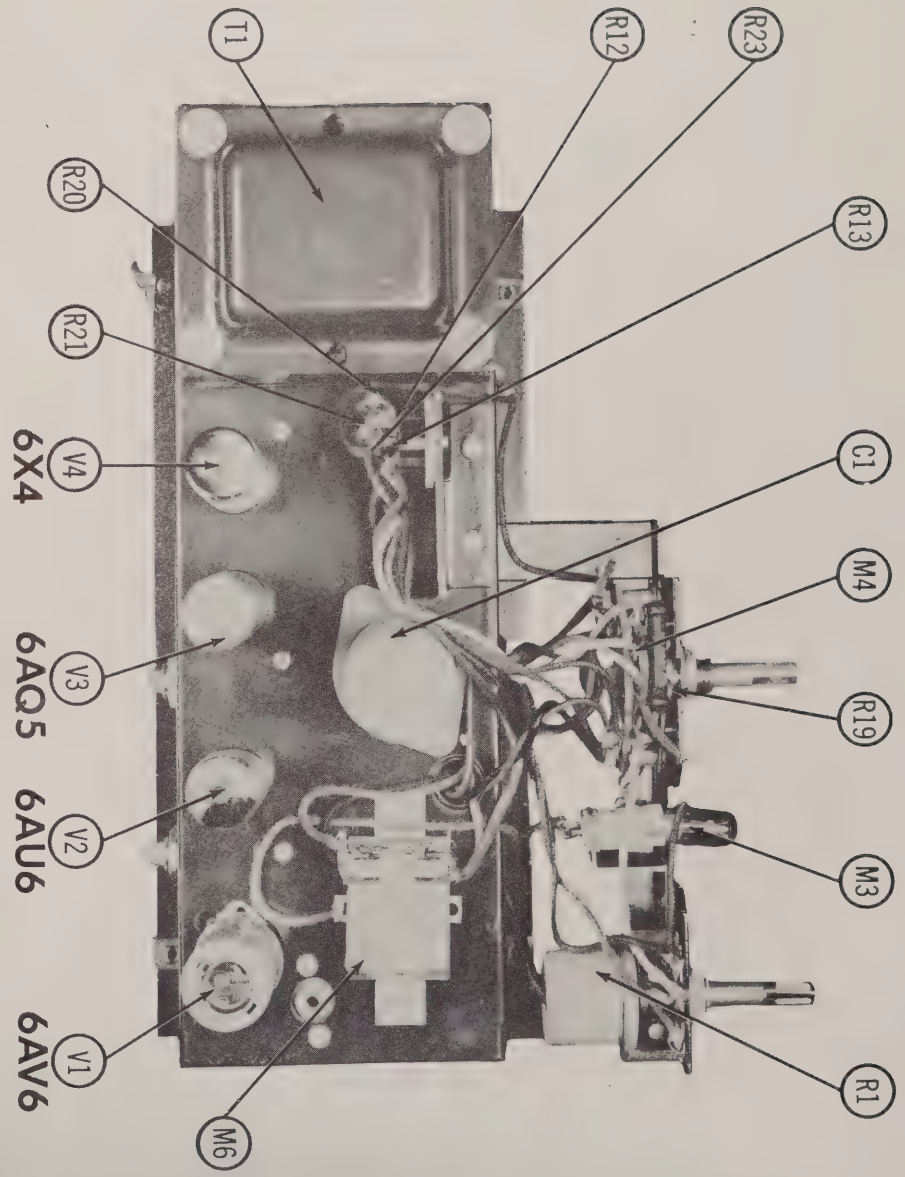
RESISTORS

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA: Webster Electric PART No.	IRC PART No.	NOTES
R4	10Meg	½		BTS-10Meg	
R5	10Meg	½		BTS-10Meg	
R6	510KΩ	½		BTS-510K	
R7	510KΩ	½		BTS-510K	
R8	1.5Meg	½		BTS-1.5Meg	
R9	510KΩ	½		BTS-510K	
R10	510KΩ	½		BTS-510K	
R11	270Ω	1			
R12	1000Ω	½		BTS-1000	
R13	1000Ω	½		BTS-1000	
R14	51Ω	½		BTS-51	
R15	75KΩ	½		BTS-75K	
R16	1000Ω	2		BTB-1000	

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA: Webster Electric PART No.	IRC PART No.	NOTES
R17	22KΩ	½		BTS-22K	
R18	75KΩ	½		BTS-75K	
R19	620Ω	½		BTS-620	
R20	1000Ω	½		BTS-1000	
R21	1000Ω	½		BTS-1000	
R22	100KΩ	½		BTS-100K	
R23	51Ω	½		BTS-51	
R24	1500Ω	½		BTS-1500	Note
R25	24Ω	½		BTS-24	
R26	24Ω	½		BTS-24	

Note: Not used in all models.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA				
	PRI.	SEC. 1	SEC. 2	SEC. 3	Webster Electric PART No.	STANCOR PART No.	MERIT PART No.	Halldorson PART No.	TRIAD PART No.
T1	117VAC @.33A	460VCT .043ADC	6.3VCT @1.52A	12V	212-15053				

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA					NOTES
	IMPEDANCE		DC RES.		Webster-Electric PART No.	STANCOR PART No.	MERIT PART No.	Halldorson PART No.	TRIAD PART No.	
	PRI.	SEC.	PRI.	SEC.						
T2	7.2KΩ	45Ω	153Ω	2.1Ω	212-15055					

SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA			NOTES
	SIZE	FIELD	V. C. IMP.	Webster Electric PART No.	JENSEN PART No.	QUAM PART No.	
SP1	4"	PM	45Ω	211-15265	ST-739 Mod. P4-X	4A07Z45	

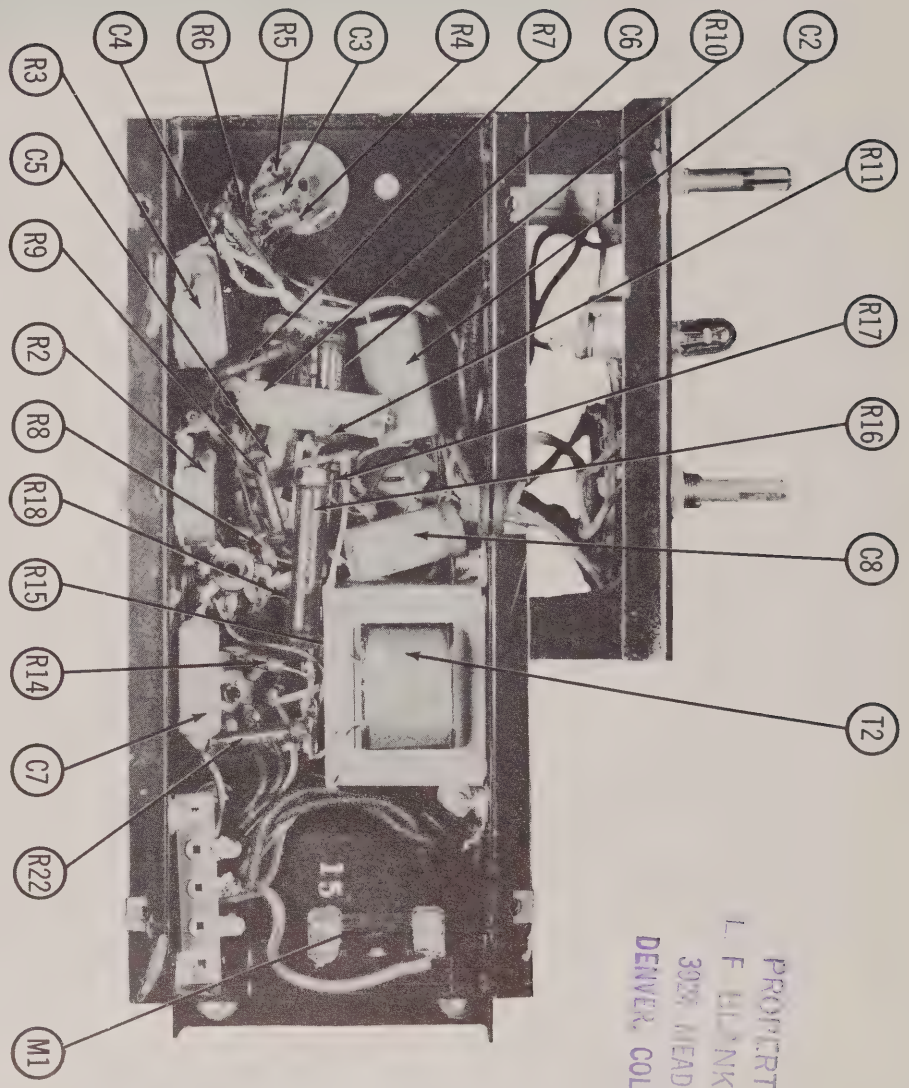
FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			Webster Electric PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M1	3AG	1A			312001 (3AG-1A)	351001	AGC 1	4406

MISCELLANEOUS

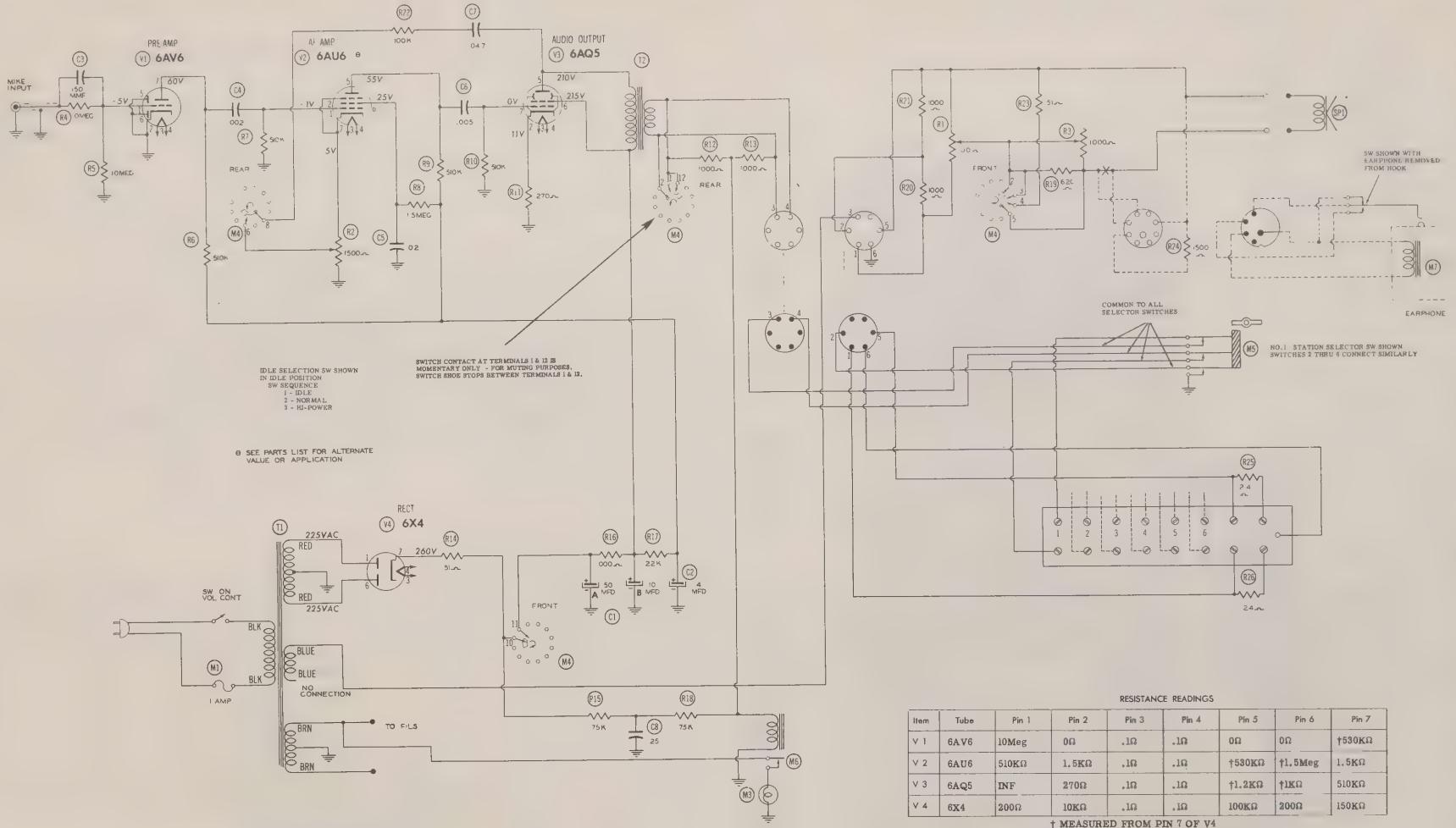
ITEM No.	PART NAME	Webster Electric PART No.	NOTES
M2	Microphone		"PN" Crystal type
M3	Dial Light		#44 Bayonet
M4	Switch		Idle-Normal-Hi-power Selector (rotary)
M5	Switch		Station designation - 6 used (toggle DPDT)
M6	Relay		Pilot Light
M7	Earphone		

CHASSIS—BOTTOM VIEW



PROPERTY OF
L. F. HUNKENSHIP
3020 MEADE ST.
DENVER, COLORADO

WEBSTER ELECTRIC "TELETALK" MODEL 906



RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V 1	6AV6	10Meg	0Ω	.1Ω	.1Ω	0Ω	0Ω	†530KΩ
V 2	6AU6	510KΩ	1.5KΩ	.1Ω	.1Ω	†530KΩ	†1.5Meg	1.5KΩ
V 3	6AQ5	INF	270Ω	.1Ω	.1Ω	†1.2KΩ	†1KΩ	510KΩ
V 4	6X4	200Ω	10KΩ	.1Ω	.1Ω	100KΩ	200Ω	150KΩ

† MEASURED FROM PIN 7 OF V4

THE COOPERATION OF THE MANUFACTURER OF THIS EQUIPMENT MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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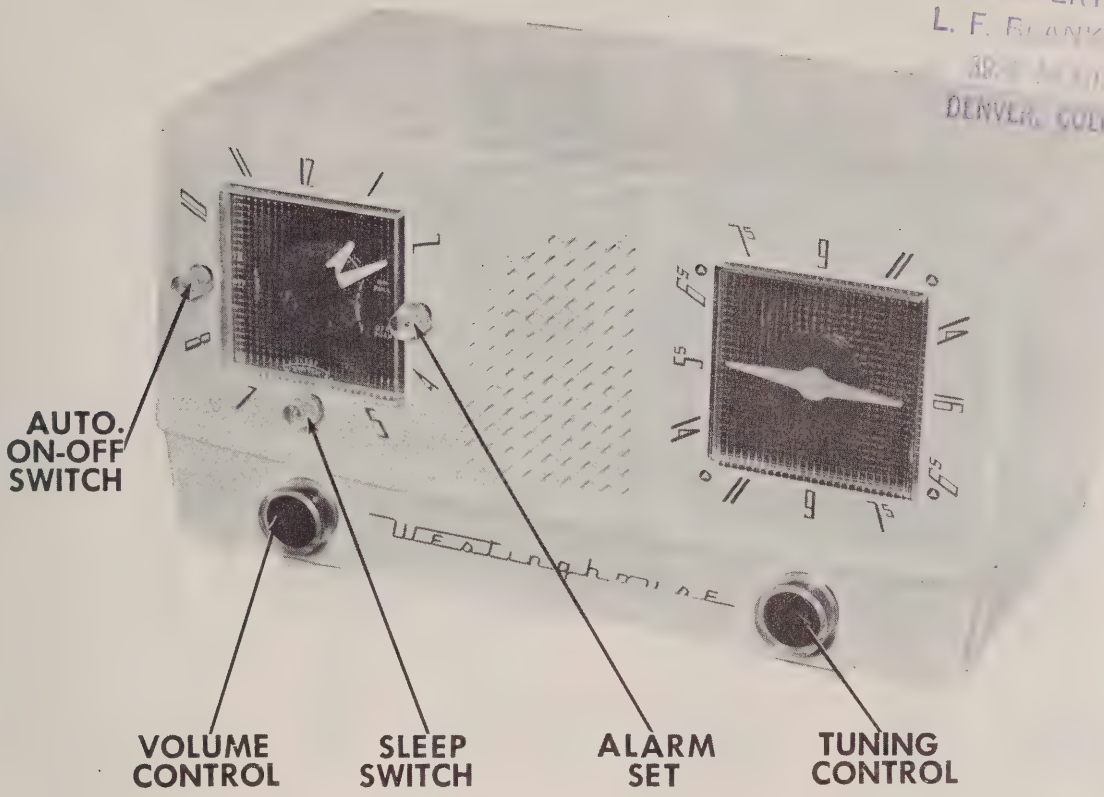
231-18

1 - DC voltage measurements are at 20,000 ohms per volt, AC voltages measured at 1000 ohms per volt.
2 - Socket connections are shown as bottom views.
3 - Measured values are from socket pin to common negative.
4 - Line voltage maintained at 117 volts for voltage readings.
5 - Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6 - All controls at minimum, proper output load connected.

PROPERTY OF
L. F. BLANKENSHIP
DENVER, COLORADO

WESTINGHOUSE MODELS
H-391T5, H-392T5 (Ch. V-2157-14)



WESTINGHOUSE MODELS
H-391T5, H-392T5 (Ch. V-2157-14)

TRADE NAME	Westinghouse Model H-391T5, H-392T5 (Ch. V-2157-14)
MANUFACTURER	Westinghouse Electric Corp., TV-Radio Div., Sunbury, Pa.
TYPE SET	AC Operated AM Superheterodyne Receiver with Electric Clock
TUBES (Five)	Types 12BE6 Conv., 12BA6 IF Amp., 12AV6 Det.-AVC-AF Amp., 50C5 Audio Output, 35W4 Rectifier
POWER SUPPLY	105-120 Volts AC-60 Cycles — RATING .25 Amp. @ 117 Volts AC
TUNING RANGE—BROADCAST	540-1600KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To set pointer, turn tuning capacitor fully closed and set pointer parallel with base of dial. Use isolation transformer, if available. If not, connect a .1MFD capacitor in series with low side of signal generator and B-. Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	200MMF	High side to antenna stator lug on tuning gang. Low side to B-.	455KC (400%Mod)	Tuning gang fully open	Across voice coil	A1, A2, A3, A4	Adjust for maximum deflection.
2.	"	"	1625KC	"	"	A5	"
3.		Loop	1400KC	Tune to 1400KC signal	"	A6	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output. Repeat steps 2 and 3.

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PARTS LIST AND DESCRIPTIONS

WESTINGHOUSE
MODEL H-391T5, (Ch. V-2157-14)

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA: WESTINGHOUSE PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RETMA BASE TYPE	NOTES
V1	Converter	12BE6	12BE6	7CH	
V2	IF Amp.	12BA6	12BA6	7BK	
V3	Det-AVC-AF Amp.	12AV6	12AV6	7BT	
V4	Audio Output	50C5	50C5	7CV	
V5	Rectifier	35W4	35W4	5BQ	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING CAP.	RATING VOLT	Westinghouse PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C1A	50	150	V-9991	PRS150/50-50		BBRD5515		2N521	TVA-2453	Orange Red
B	50	150								
C2	.05	200	RCP10W2503M	P288-05	DF-503	PJ2S5		PT415	2TM-S5	
C3A	220									
B	5000									
C	5000		*V-10789-2	*PA-113-2	*PC-151		*1408-02		*103C5	
D	250									
E										
C4	.01	400	RCP10W4103M	P488-01	DD-103	PTE4S1	GP2-333-103	PT411	4TM-S1	
C5	.047	400	V-10157-4473M	489ZX-047		PJ4S47		PT4147	4TM-S47	
C6	.05	400	RCP10W4503M	P488-05		PTE4S5		PT415	4TM-S5	

* Items C3A, C3B, C3C, C3D, C3E, R5A, R5B and R5C are combined in one unit.
When replacing items separately items C3D and C3E should total 250MMF.

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	Westinghouse PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	500KΩ	½	V-9993-9	Q13-133	AG-60-Z	BSK-60	U-48	Volume
B	Shaft		Not Req.	Not Req.	KSS-3	Not Req.	Not Req.	Attach to R1A

RESISTORS

ITEM No.	RATING OHMS	RATING WATT	Westinghouse PART No.	IRC PART No.	NOTES
R2	22KΩ	½	RC20AE223M	BTS-22K	
R3	3.3Meg	½	RC20AE335M	BTS-3.3Meg	
R4	68Ω	½	RC20AE680M	BTS-68	

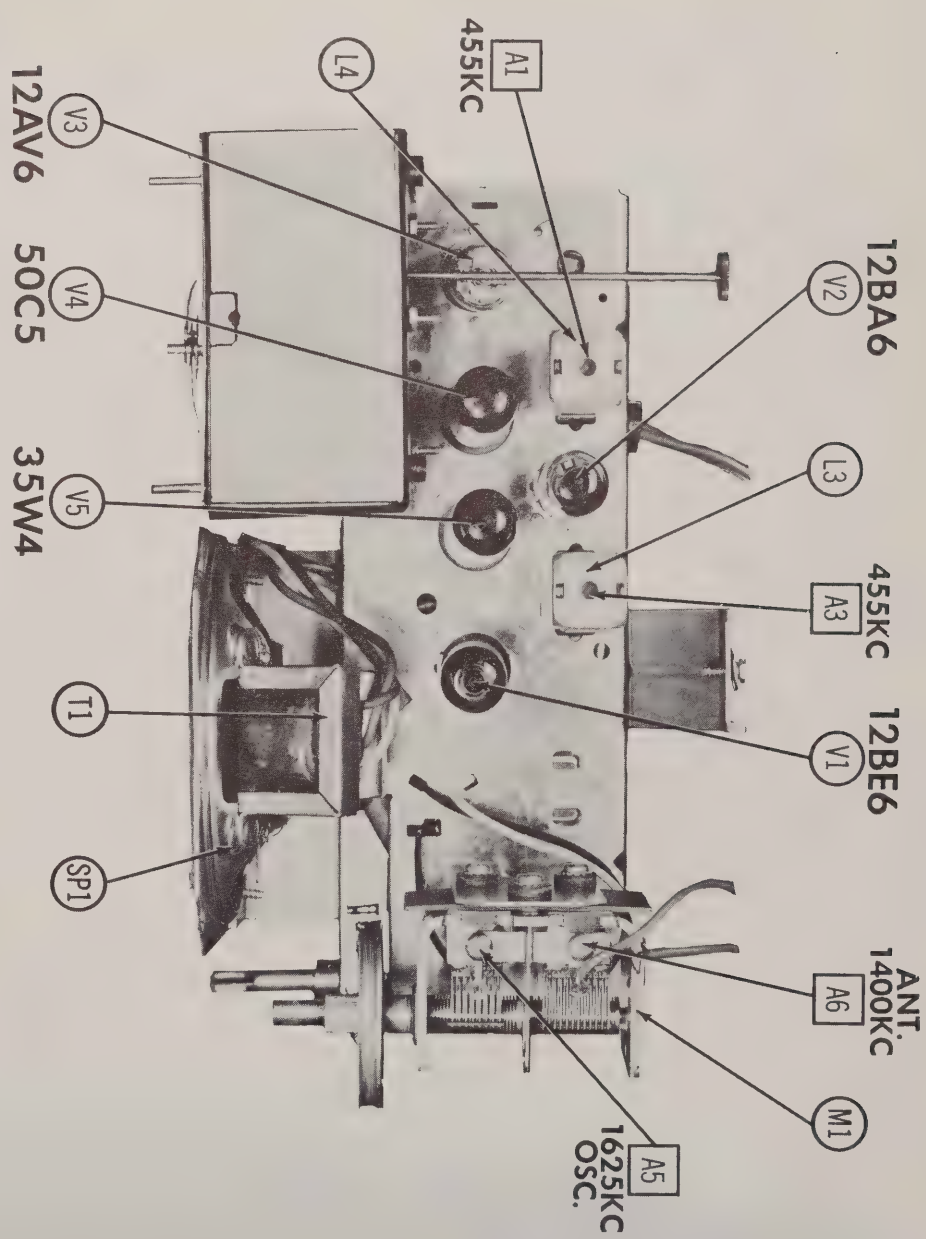
ITEM No.	RATING OHMS	RATING WATT	Westinghouse PART No.	IRC PART No.	NOTES
R5A	6.8Meg	½		BTS-6.8Meg	
B	470KΩ	½	*V-10789-2	BTS-470K	
C	470KΩ	½		BTS-470K	
R6	150Ω	½	RC20AE151M	BTS-150	
R7	1500Ω	1	RC30AE152M	BTA-1500	

* Items R5A, R5B, R5C, C3A, C3B, C3C, C3D, C3E are combined in one unit.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	RATING IMPEDANCE PRI.	RATING IMPEDANCE SEC.	DC RES. PRI.	DC RES. SEC.	Westinghouse PART No.	STANCOR PART No.	MERIT PART No.	Halldorson PART No.	TRIAD PART No.	NOTES
T1	2KΩ	3.3Ω	204Ω tap @ 9.8Ω	.85Ω	Part of Spkr. V-10079-2					

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA			NOTES
	SIZE	FIELD	V. C. IMP.	Westinghouse PART No.	JENSEN PART No.	QUAM PART No.	
SP1	4"	PM	3.3Ω	V-10079-2	ST-113 Mod. P4-X	4A07	

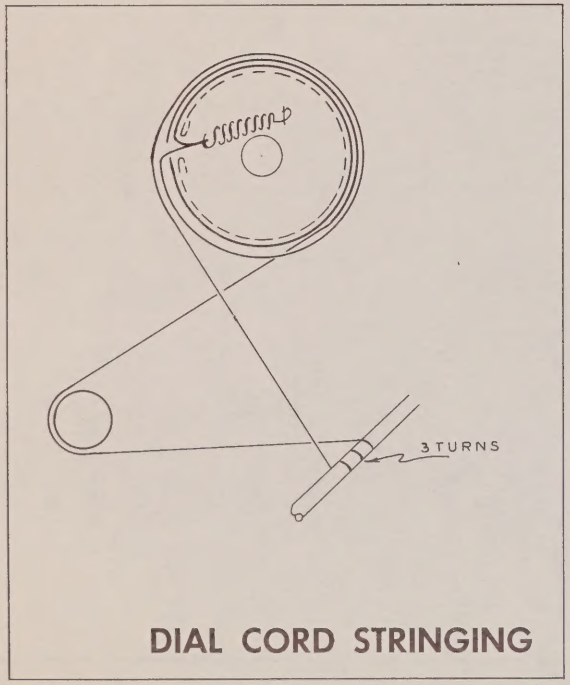
COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	Westinghouse PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	Loop Ant.	3.1Ω		V-11405-2				Includes cabinet back
L2	Osc. Coil	1.	12Ω	V-9992	14-1073		69-Osc *	
L3	Input IF	16Ω	16Ω	V-10945-1	16-6758	BC-352	12-C1	
L4	Output IF	16Ω	16Ω	V-10945-1	16-6758	BC-353	12-C2	

* Drill mounting hole.

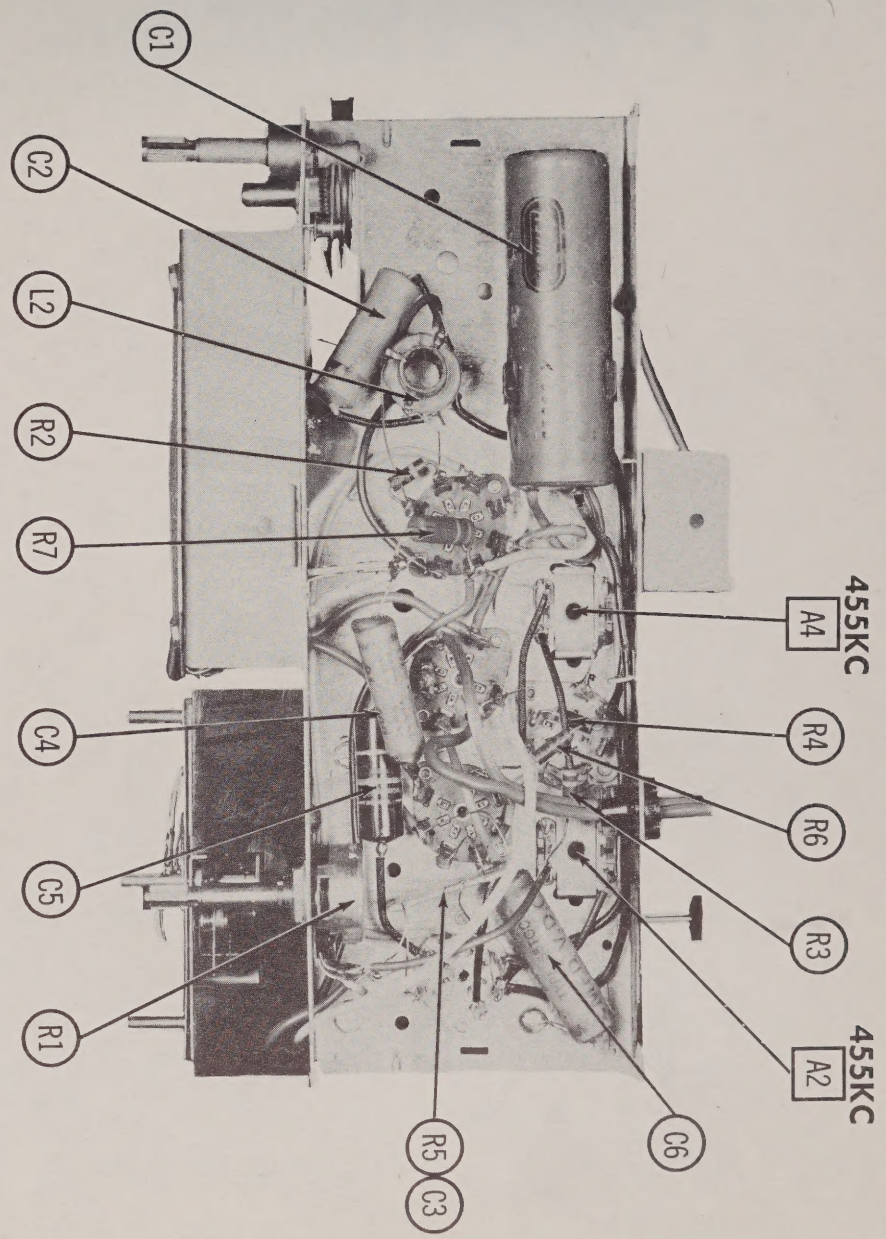
MISCELLANEOUS

ITEM No.	PART NAME	Westinghouse PART No.	NOTES
M1	Tuning cap	V-11508-1	2 section (14-390MMF, 16-110MMF)
	Cabinet	V-1290-5	Model (H-391T5)
	Cabinet	V-1290-2	Model (H-392T5)
	Knob	V-11573-1	(3) clock
	Knob	V-100009-5	(2) Volume & tuning
	Pointer	V-11574-1	



DIAL CORD STRINGING

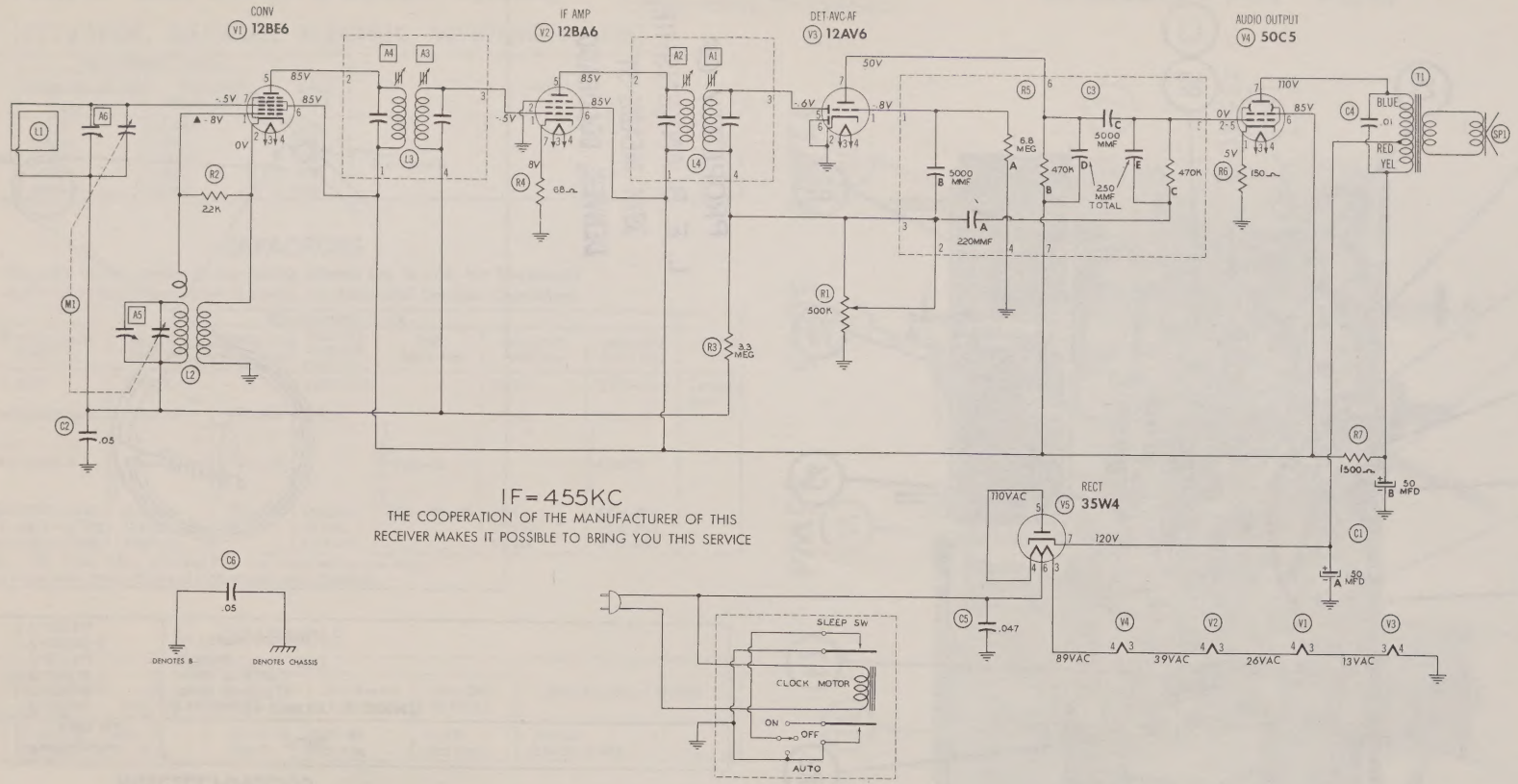
CHASSIS—BOTTOM VIEW



PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

WESTINGHOUSE
MODEL H-391T5, (Ch. V-2157-14)

WESTINGHOUSE
MODEL H-391T5, (Ch. V-2157-14)



IF = 455KC

THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V 1	12BE6	22KΩ	1Ω	12Ω	24Ω	†1.5KΩ	†1.5KΩ	3.8Meg
V 2	12BA6	3.8Meg	0Ω	24Ω	36Ω	†1.5KΩ	†1.5KΩ	68Ω
V 3	12AV6	6.8Meg	0Ω	12Ω	0Ω	500KΩ	0Ω	†470KΩ
V 4	50C5	150Ω	470KΩ	36Ω	80Ω	470KΩ	†1.5KΩ	†195Ω
V 5	35W4	INF	INF	80Ω	110Ω	110Ω	100Ω	50KΩ

† MEASURED FROM PIN 7 OF V5

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

A PHOTOFACT STANDARD NOTATION SCHEMATIC
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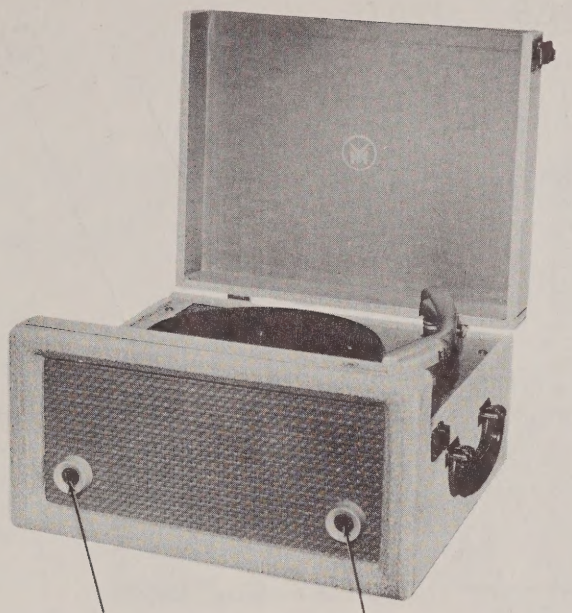
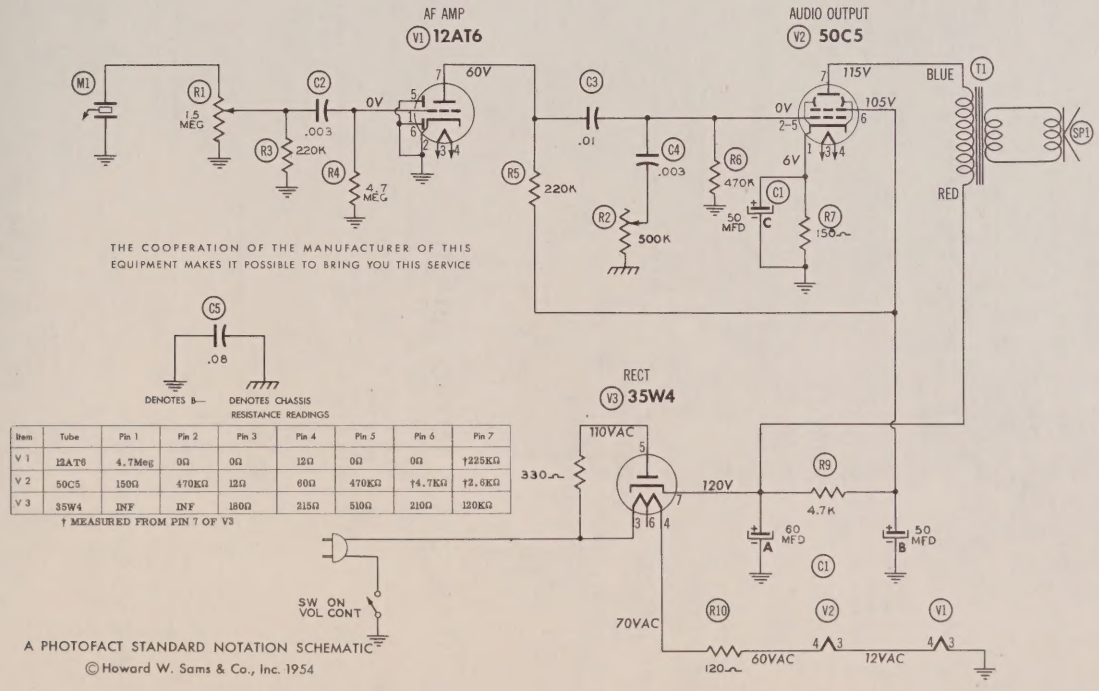
...NSHIP
3924 MEADE ST.
DENVER, COLORADO

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO



TRADE NAME	V-M Model 151
MANUFACTURER	V-M Corp., Benton Harbor, Michigan
TYPE SET	AC Operated Phono Amplifier with 3 Speed Manual Record Player
TUBES (Three)	Types 12AT6 AF Amp., 50C5 Audio Output, 35W4 Rectifier
POWER SUPPLY	105-125 Volts AC-60 Cycles RATING .22 Amp. @ 117 Volts AC

V-M
MODEL 151



Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V 1	12AT6	4.7Meg	0Ω	0Ω	12Ω	0Ω	0Ω	†225KΩ
V 2	50C5	150Ω	470KΩ	12Ω	60Ω	470KΩ	†4.7KΩ	†2.6KΩ
V 3	35W4	INF	INF	180Ω	215Ω	510Ω	210Ω	120KΩ

† MEASURED FROM PIN 7 OF V3

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		V-M PART No.	STANDARD REPLACEMENT		
V1	AF Amplifier	12AT6	12AT6	7BT	
V2	Audio Output	50C5	50C5	7CV	
V3	Rectifier	35W4	35W4	5BQ	

CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP.	VOLT	V-M PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C1A	60	150		PRS150/80-40		BBRD5515		3N540	R1425	Red
B	50	150		PRS50/150		BR502A				Green
C	50	20		P688-003	D6-302	PTE6D3	GP2-333-302	PT623	6TM-D3	Yellow
C2	.003	400		P488-01	D6-103	PTE4S1	GP2-333-103	PT415	4TM-S5	
C3	.01	400		P688-003	D6-302	PTE6D3	GP2-333-103	PT623	6TM-D3	
C4	.003	400								
C5	.08	400								

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	V-M PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	
R1A	1.5Meg	1/2	11941	Q13-139	AG-60-Z	AB-7β	U-55	Volume
B	Shaft		Not Req.	Not Req.	KSS-3	AK-4	Not Req.	Attach to R1A
C	Switch		Not Req.	76-1	SWB	KB-1	US-26	Attach to R1A
R2A	500KΩ	1/2	11944	Q13-133	AG-60-Z	BSK-60	U-48	Tone
B	Shaft		Not Req.	Not Req.	KSS-3	Not Req.	Not Req.	Attach to R2A

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	V-M PART No.	IRC PART No.	
R3	220KΩ	1/2		BTS-220K	
R4	4.7Meg	1/2		BTS-4.7Meg	
R5	220KΩ	1 1/2		BTS-220K	
R6	470KΩ	1 1/2		BTS-470K	

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	V-M PART No.	IRC PART No.	
R7	150Ω	1/2		BTS-150	
R8	330Ω	1/2		BTS-330	
R9	4.7KΩ	1/2		BTS-4.7K	
R10	120Ω	5		1 3/4A-125	

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA					NOTES
	IMPEDANCE		DC RES.		V-M PART No.	STANCOR PART No.	MERIT PART No.	Halldorson PART No.	TRIAD PART No.	
	PRI.	SEC.	PRI.	SEC.						
T1	2.6KΩ	3.3Ω	230Ω	.7Ω		A-3332 ①	A-3025 ①	Z1005 ①	S-1X ①	① Bend mounting tabs down, file out slots, mount on original mounting bracket.

SPEAKER

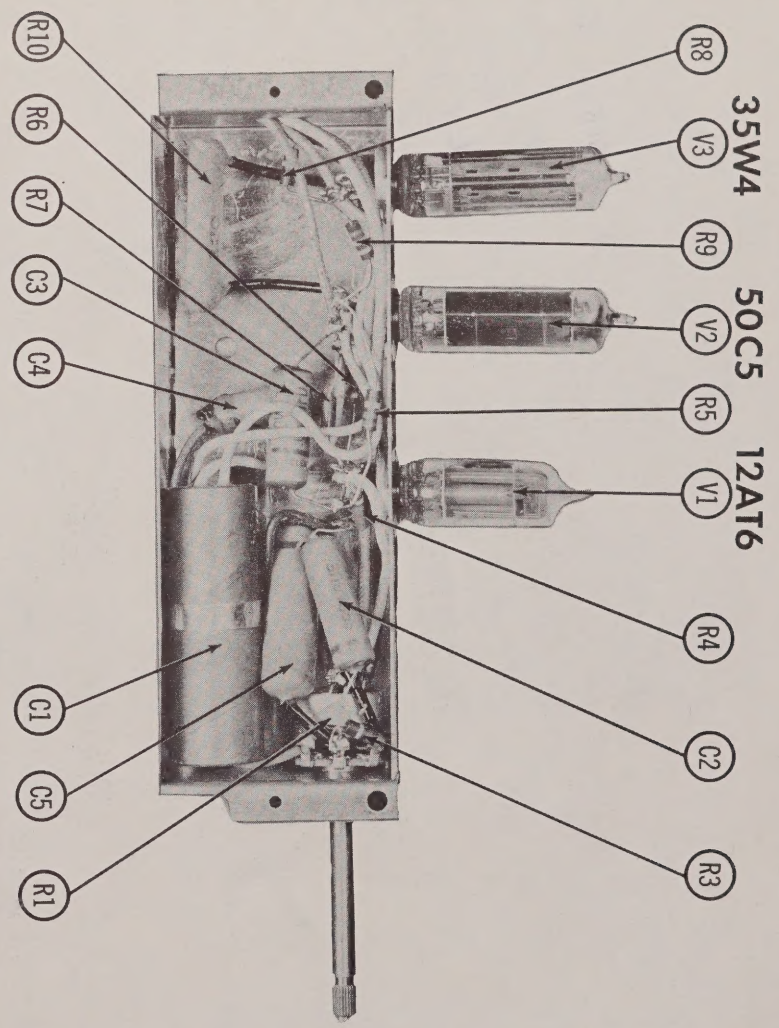
ITEM No.	RATINGS			REPLACEMENT DATA			NOTES
	SIZE	FIELD	V. C. IMP.	V-M PART No.	VIKING PART No.	QUAM PART No.	
SP1	4 x 6"	PM	3.3Ω		46J6	46A07	

PHONO CARTRIDGE

ITEM No.	REPLACEMENT DATA							REMARKS
	V-M PART No.	ASTATIC PART No.		SHURE PART No.		ELECTRO-VOICE PART No.		
		CARTRIDGE	NEEDLE	CARTRIDGE	NEEDLE	CARTRIDGE	NEEDLE	
M1		ACD-CJ	AJ-1	WC24	A53MG	46-0	0-1	* Complete tone Arm and cartridge Assembly,
		* 9-D	AJ-3		A52A	* 2600	0-3	

ASTATIC, SHURE AND ELECTRO-VOICE NEEDLE LISTINGS SHOWN ABOVE ARE SPECIFIED FOR THE RESPECTIVE REPLACEMENT CARTRIDGES LISTED. FOR ORIGINAL CARTRIDGE NEEDLE REPLACEMENT SEE BELOW.

CHASSIS—BOTTOM VIEW



PHONO NEEDLE

(FOR REPLACEMENT IN ORIGINAL EQUIPMENT CARTRIDGE)

ITEM No.	REPLACEMENT DATA			REMARKS
	V-M PART No.	WALCO PART No.	JENSEN PART No.	
M2		W-31MGA and W-31A	JP-32LP or JPS-32LP and JP-32 or JPS-32	